Prepared for:

Chino Mines Company

Hurley, New Mexico

Administrative Order on Consent

Technical Memorandum

Summer Rainfall Pool Sampling

Hanover/Whitewater Creeks Investigation Units

Prepared by:

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ACRONYMS

Chino	Chino Mines Company
EPA	U.S. Environmental Protection Agency
Golder	Golder Associates Inc.
H/WCIUs	Hanover and Whitewater Creeks Investigation Units
NMED	New Mexico Environment Department
s.u.	standard units
TDS	total dissolved solids
TSS	total suspended solids
QAP	Quality Assurance Plan

1.0 INTRODUCTION

Summer rainfall pools were first sampled in 1999 as part of the Phase 1 Remedial Investigation for Hanover/Whitewater Creeks Investigation Units (H/WCIUs) (Golder Associates Inc.[Golder], 2000), but in support of the Sitewide Ecological Investigation Unit. In a meeting on September 8, 2006, the New Mexico Environment Department (NMED) informed Chino Mines Company (Chino) that additional water quality data for summer rainfall pools were needed for the supplemental ecological risk assessment under the H/WCIUs. Chino determined that there was still a window of opportunity to collect these surface water samples from the 2006 summer rain events avoiding the need to wait for the 2007 rainy season to form pools again. Golder coordinated with the NMED to clarify the scope of work and collected the required surface water samples during mid-September 2006 while the summer rainfall pools were still present. This technical memorandum presents the results of the summer rainfall pool sampling in Hanover and Whitewater Creeks. It is organized into seven sections:

- **Section 1.0 – Introduction** discusses the background and objectives of the project.
- **Section 2.0 – Objectives and Data Needs** presents the rationale for the sampling approach.
- **Section 3.0 – Summer Rainfall Pool Sampling Event** summarizes the field activities for the project.
- **Section 4.0 – Data Validation and Data Quality Assessment** summarizes the quality of the analytical results and the usability of the data for the project objectives.
- **Section 5.0 – Results** presents the analytical data and a comparison to surface water standards.
- **Section 6.0 - Summary** presents the key findings of the project.
- **Section 7.0 – References** lists documents used in preparation of this technical memorandum.

2.0 OBJECTIVES AND DATA NEEDS

The objective of the sampling was to provide representative data from summer rainfall pools for use in assessing potential risks to human health, and aquatic and semi-aquatic receptors within the Hanover and Whitewater Creek drainages. The general data needs are the location and description of the pools and analytical data from samples. The analytical data needs are:

- metals with designated use standards for wildlife habitat and aquatic wildlife (chronic and acute);
- total and dissolved fractions for all metals being analyzed;
- hardness for calculation of hardness-dependent standards;
- field parameters (i.e., pH, temperature, and conductivity); and
- total dissolved solids (TDS) and total suspended solids (TSS).

Table 1 contains the list of constituents, laboratory methods, and reporting limits.

For the total metals analyses, total recoverable metal analyses are statistically indistinguishable based on personal communication with SVL Analytical and an August 19, 1998 memo from William Telliard, Director of Analytical Methods Staff in the U.S. Environmental Protection Agency's (EPA) Engineering and Analysis Division entitled *Total vs. Total Recoverable Metals*. The EPA report states "For effluent guidelines, for permitting under NPDES, and for other purposes in EPA's water programs, the terms 'total metal' and 'total recoverable metal' may be used interchangeably to reflect that it is the hard mineral acid digestion procedure that is used" (EPA, 1998).

The number of samples depends on the number of pools encountered and could not be specified a priori. However, samples were to be collected if possible from the following physical reaches:

- P0 (Bayard Canyon and tributaries),
- P1 (Hanover Creek),
- P2 (Upper Whitewater),
- P3 (Whitewater from railroad trestle on north end of Lake One), and
- P9 (Whitewater on either side of Hwy 180).

Within these physical reaches, rainfall pool locations from 1999 were resampled when possible. Sample locations attempted to capture the variability of pools within the entire physical reach. The physical reaches south in Lower Whitewater Creek (i.e., south of P9) were not included because pools disappear quickly in the basin fill materials and access is difficult in the rainy season.

3.0 SUMMER RAINFALL POOL SAMPLING EVENT

Sampling each summer rainfall pool included:

- Documentation of location and physical conditions of site.
- Use of new latex gloves.
- Collection of three samples in 500 ml bottles as follows:
  - dissolved metals – filtered and preserved with nitric acid to pH <2;
  - total metals – unfiltered and preserved with nitric acid to pH <2; and
  - TDS, TSS, hardness – raw sample (unpreserved and unfiltered).
- Filtering water for the dissolved metals sample with new disposable 140 cc plastic syringes and high capacity 0.45 µm filters. All equipment was disposable and pre-rinsed with sample water prior to sample collection.
- Collection and recording of field parameters including pH, conductivity, and temperature with calibrated meter.
- Logging samples on chain-of-custody forms included in the sample coolers.
- Storing samples on ice and keeping them cold until arrival at SVL Analytical in Kellogg, Idaho.

The summer rainfall pool locations are shown on Figure 1 and described in Table 2. Appendix A includes photographs of all sample locations.

4.0 DATA VALIDATION AND DATA QUALITY ASSESSMENT

All laboratory data for the summer rainfall pool samples were validated according to the Quality Assurance Plan (QAP) (Chino/SRK, 1997). After validation, data quality was assessed to reconcile data quality with the end uses and project objectives, and to identify deviations from the QAP and their potential effects on the usability of the data. The Data Validation Report and the Data Quality Assessment Report are included as Appendices B and C, respectively.

The overall quality of the 504 analytical results was sufficient to meet project objectives. Overall quality was assessed by the quantitative parameters of reporting limits, accuracy, precision, completeness, and by the qualitative parameters of representativeness and comparability. The overall level of accuracy was considered acceptable for the site-specific

sample matrix. Because the laboratory duplicate pairs and field duplicate pairs satisfied the requirements of the QAP, overall precision was also considered acceptable. Program completeness was 100 percent, meaning that all samples specified in the informal Sampling and Analysis Plan were collected. Analytical completeness was 100 percent (i.e., 0 analytical results were rejected). Reporting limits obtained were generally sufficient for comparing results to decision criteria, with one exception as noted in Appendix C.

Based on the results of the data review, 16 of 504 results (3.1 percent) were qualified as non-detect, 43 of 504 results (8.5 percent) were qualified as estimated, and 0 results (0 percent) were qualified as rejected. The Data Validation Report (Appendix B) details the specific reasons for which results were qualified as estimated or non-detected. All other results were determined to be valid and, thus, usable for reconciliation with the project objectives. However, one cadmium result, for BFT-1(Dissolved Metals), was determined to be unusable for comparison to the New Mexico hardness-dependent acute aquatic life surface water quality standard for cadmium because the reported non-detect concentration exceeds that value. The Data Quality Assessment Report (Appendix C) describes this specific result that is unusable for comparison to the standards.

There were no QAP or Field Sampling Plan modifications implemented during the course of this sampling event and analytical analyses.

5.0 RESULTS

The laboratory analytical results for summer rainfall pool samples and a comparison to the State of New Mexico Standards for Interstate and Intrastate Surface Water Standards (20.6.4 NMAC) are presented in Tables 3 through 12. Hanover and Whitewater Creeks are not included as classified waters of the state. The default criteria for intermittent non-classified waters listed in NMAC 20.6.4.98 include the livestock watering, wildlife habitat, and aquatic life water quality standards. The acute aquatic life standards for dissolved silver, dissolved cadmium, dissolved chromium, dissolved copper, dissolved lead, dissolved nickel, and dissolved zinc are hardness dependent. The chronic aquatic life standards for dissolved cadmium, dissolved chromium, dissolved copper, dissolved lead, dissolved nickel, and dissolved zinc are also hardness dependent.

5.1 HC-51.6

The dissolved fraction for cadmium in the sample from HC-51.6 exceeded the Aquatic Life – Chronic surface water standard. Dissolved zinc exceeded both Aquatic Life – Chronic and Aquatic Life – Acute surface water standards.

5.2 WWC-38.1

Dissolved aluminum at WWC-38.1 exceeded the Aquatic Life – Chronic surface water standard. The dissolved fractions of cadmium, copper, and zinc all exceeded both Aquatic Life – Chronic and Aquatic Life – Acute surface water standards.

5.3 BC-1

The dissolved cadmium fraction in the BC-1sample exceeded the Aquatic Life – Chronic surface water standard. Dissolved copper exceeded both Aquatic Life – Chronic and Aquatic Life – Acute surface water standards.

5.4 BFT-1

pH at BFT-1 (6.27 standard units [s.u.]) was below the surface water standards for Livestock Watering, Wildlife Habitat, and Aquatic Life (both Chronic and Acute). The Aquatic Life – Chronic surface water standard for dissolved cadmium was lower than the detection limit for this metal and no comparison can be made. Dissolved copper exceeded both Aquatic Life – Chronic and Aquatic Life – Acute surface water standards.

5.5 WWC-29.7

The dissolved fractions of both cadmium and copper at WWC-29.7 exceeded the Aquatic Life – Chronic surface water standard.

5.6 WWC-28.6

Dissolved aluminum at WWC-28.6 exceeded the Aquatic Life – Chronic surface water standard. The dissolved fractions of cadmium, copper, and zinc exceeded both Aquatic Life – Chronic and Aquatic Life – Acute surface water standards.

5.7 Grunerud-1

pH at Grunerud-1 (4.56 s.u.) was below the surface water standards for Livestock Watering, Wildlife Habitat, and Aquatic Life (both Chronic and Acute). Dissolved aluminum, cadmium, copper, and zinc exceeded both Aquatic Life – Chronic and Aquatic Life – Acute surface water standards. Dissolved copper also exceeded the standard for Livestock Watering.

5.8 B-Ranch

pH at B-Ranch (4.23 s.u.) was below the surface water standards for Livestock Watering, Wildlife Habitat, and Aquatic Life (both Chronic and Acute). Dissolved aluminum, cadmium, copper, and zinc exceeded both Aquatic Life – Chronic and Aquatic Life – Acute surface water standards. Dissolved copper also exceeded the standard for Livestock Watering. Dissolved nickel exceeded the Aquatic Life – Chronic surface water standard.

5.9 WWC-H180

pH at WWC-H180 (5.85 s.u.) was below the surface water standards for Livestock Watering, Wildlife Habitat, and Aquatic Life (both Chronic and Acute). Dissolved aluminum exceeded the Aquatic Life – Chronic surface water standard. Dissolved cadmium, copper, and zinc exceeded both Aquatic Life – Chronic and Aquatic Life – Acute surface water standards.

5.10 LWWC-1

pH at LWWC-1 (4.99 s.u.) was below the surface water standards for Livestock Watering, Wildlife Habitat, and Aquatic Life (both Chronic and Acute). Dissolved aluminum and cadmium exceeded the Aquatic Life – Chronic surface water standards. Dissolved copper and zinc exceeded both Aquatic Life – Chronic and Aquatic Life – Acute surface water standards. Dissolved copper also exceeded the standard for Livestock Watering.

6.0 SUMMARY

Ten summer rainfall pool samples were collected in September 2006. Summer rainfall pools are typically limited in size, on the order of tens to hundreds of square feet. They are created by rainfall and runoff, and therefore are also limited in duration, sometimes persisting only hours to days if not fed by additional runoff. They may flow temporarily, but may also be stagnant. Exposure to the surface water in these pools is limited relative to other potential media because of their typically small size and short duration; however, for species that depend on the presence of surface water for reproductive purposes, the presence of these pools may be critical.

The dissolved and total (or total recoverable) results were compared to New Mexico surface water quality standards for livestock watering, wildlife habitat, and aquatic life (acute and chronic). None of the samples exceeded standards under the designated uses for arsenic, boron, chromium, cobalt, lead, mercury, selenium, silver, and vanadium. However, half of the samples were out of the acceptable pH range under the designated uses. Most of the samples exceeded the Aquatic Life - Chronic standards for cadmium, copper, and zinc, as well as the Aquatic Life - Acute standards for copper and zinc. Other exceedances included aluminum for some of the designated uses.

7.0 REFERENCES

Chino Mines Company and Steffen, Robertson and Kirsten (1997). Administrative Order on Consent, Quality Assurance Plan. Prepared for Chino Mines Company, Hurley, New Mexico. March 1997.

Golder Associates Inc. (2000). Administrative Order on Consent, Phase 1 Remedial Investigation Report, Hanover and Whitewater Creeks Investigation Units. Prepared for Chino Mines Company, Hurley, New Mexico. May 25, 2000.

U.S. Environmental Protection Agency (1998). Total vs. Total Recoverable Metals. Engineering and Analysis Division. August 19, 1998.

TABLES

TABLE 1 LIST OF ANALYTES, METHODS, AND REPORTING LIMITS			
Analyte	**Fraction(s) for Analysis**	**Method of Analysis**	**Laboratory Reporting Limit (µg/L)**
Aluminum (Al)	Dissolved and Total	200.7	30
Antimony	Dissolved and Total	200.7	20
Arsenic (As)	Dissolved and Total	200.7	25
Barium (Ba)	Dissolved and Total	200.7	2
Boron (B)	Dissolved and Total	200.7	40
Cadmium (Cd)	Dissolved and Total	200.8	.042/.105
Chromium (Cr)	Dissolved and Total	200.7	6
Cobalt (Co)	Dissolved and Total	200.7	6
Copper (Cu)	Dissolved and Total	200.8	.2/.5
Iron (Fe)	Dissolved and Total	200.7	60
Lead (Pb)	Dissolved and Total	200.8	.220/.550
Manganese (Mn)	Dissolved and Total	200.7	4
Mercury (Hg)	Dissolved and Total	245.1	0.2
Molybdenum (Mo)	Dissolved and Total	200.7	8
Nickel (Ni)	Dissolved and Total	200.7	10
Selenium (Se)	Dissolved and Total	200.8	0.625
Silver (Ag)	Dissolved and Total	200.8	.03/.075
Thallium	Dissolved and Total	200.8	.1/.25
Vanadium (V)	Dissolved and Total	200.7	5
Zinc (Zn)	Dissolved and Total	200.7	10
Total Dissolved Solids (TDS)	Total	160.1	10
Total Suspended Solids (TSS)	Total	160.2	5
Hardness	Total	calc	---

Notes:

SVL limits noted as Dissolved / Total (i.e., Cd - .042/.105)

µg/L = micrograms per liter

TABLE 2
SAMPLE LOCATIONS AND DESCRIPTIONS

Sample Name	Reach Designation	Sample Stationing	Easting (NMSP-NAD83)	Northing (NMSP-NAD83)	Estimated Flow Rate (gpm)	Channel Morphology	Estimated Pool volume (gallons) and average pool dimensions (length x width x depth in feet)	Aquatic or Terrestrial Life Observations	Estimated Persistence of Water Feature	Field pH	Field Temperature (°C)	Specific Conductance (µS/cm)	Comments
HC-51.6	P1	Hanover Creek - 51.6	2,641,865	655,062	100	Shallow alluvium with intermediate to mafic dikes cutting across creek resulting in small pool drop morphology.	10-gallon pool with a maximum depth of 8 inches	None	months	8.1	14.6	2,730	White precipitates in relatively stagnant pools adjacent to sample site.
WWC-38.1	P2	Whitewater Creek - 38.1	2,635,610	646,019	100	Slotted bedrock channel with approximately 4-foot waterfall at upstream end of slot. Bedrock composed of mafic to intermediate intrusive with abundant feldspar laths (potential andesite).	50-gallon pool with a maximum depth of 18 inches	one invertebrate - small beetle	months	7.9	20	2,740	Bedrock stained with iron - also, ferricretes cemented conglomerates on first overbank above active channel.
BC-1	NA	Bayard Canyon - no stationing available	2,633,573	640,851	25	Riffle pool alluvial channel.	500-gallon pool with a maximum depth of approximately 8 inches - pool dimensions (40' x 6' x 0.5")	two aquatic species noted	months of surface flow is estimated with persistent shallow sub-surface flow as indicated by abundant vegetation	7.7	16.5	437	Highly vegetated area.
BFT-1	NA	Bayard Falls Tributary	2,635,284	641,360	15	Large pool in steep gradient boulder channel approximately 100 feet below significant (approximately 20 feet) bedrock (volcanic tuff) waterfall.	1,200- to 1,500-gallon pool - dimensions (15' x 10' x 3')	no invertebrates noted	months	6.3	14.3	102	Slight to moderate anaerobic odor (swampy) in some section of creek near sample area - slight odor noted at sample area. Yellowish algae in low flow threads of channel.
WWC-29.7	P3	Whitewater Creek - 29.7	2,632,957	639,895	100	Braided alluvial channel immediately below confluence with Bayard Canyon.	750-gallon pool - dimensions (25' x 4' x 1')	6 species noted and two sets of deer tracks	months	7.5	18.3	1,049	Large sand bar splits flow - channel being sampled receives water from Bayard Canyon. Abundant white precipitates in channel not being sampled - pH of other channel is 6.59, considerably lower than sampled channel. Sample collected immediately above wood structure (old plank fence that's mostly buried).
WWC-28.6	P3	Whitewater Creek - 28.6	2,632,066	639,164	150	Braided alluvial channel with small scour pools behind and adjacent to boulders in channel.	300-gallon pool - dimensions (10' x 5' x 1.5')	one invertebrate	months	7.2	20.4	2,430	Water turns turbid half way through sample collection (raw and total sample collected from turbid water). Initially thought that turbidity is due to off-road vehicle activity upstream of sample location, however, notice water coming from haul road adjacent to sample location.
Grunerud-1	P3	Approximately Whitewater Creek - 16.0	2,632,538	627,963	150	Single strand flow on wide braided alluvial drainage - active channel approximately 150-feet wide with riffle pool sections caused by ferricrete.	150-gallon pool - dimensions (20' x 4' x 0.5')	biological observations not made	weeks to months	4.6	22.7	3,110	Sample taken on inside of meander bend (small point bar) - abundant with precipitates.
B-Ranch	P3	Approximately Whitewater Creek - 12.0	2,634,906	621,929	150	Wide braided alluvial channel (sand/gravel/cobble) with two active channels during sampling event.	700-gallon pool - dimensions (75' x 6' x 0.25')	biological observations not made	weeks to months	4.2	21.1	3,200	Sample location approximately 500 meters upstream of road ford/pipeline crossing and approximately 200 meters downstream of two green monitoring wells on east bank of drainage (opposite of white tuff outcrop).
WWC-H180	P9	Approximately Whitewater Creek - (-) 37	2,645,515	581,063	pool fed by subflow with approximately 10 gpm leaving pool	Braided alluvial channel.	200-gallon pool - elongated pool along downstream side of Highway 180 bridge foundation	biological observations not made	weeks to months	5.9	21.3	1,326	Notable decrease in the white precipitates as compared to upstream sampling locations - quick sand near sample location - majority of reach visible from sample location is flowing with some short sections of subflow.
LWWC-1	P9	Approximately Whitewater Creek - (-) 39	2,644,994	579,652	0 (fed by subflow)	Braided alluvial channel.	2,000-gallon pool - dimensions (100' x 5' x 0.75')	biological observations not made	weeks to months	5.0	18.1	744	Pool is terminal surface water feature along drainage. Thorough walk through investigation revealed no additional surface water features in Lower Whitewater Creek (down to approximately Whitewater Creek station -70).

Notes:
gpm = gallons per minute
µS/cm = microSiemens per centimeter

Sample Location: HC-51.6
Sample Date: 9/20/2006

TABLE 3
HC-51.6 RESULTS AND COMPARISON TO SURFACE WATER STANDARDS

Parameters and Constituents		Surface Water Standards								Results							
		Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
Name	Units	Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	8.1	---
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14.6	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2730	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	<0.0069		---	---	0.299		---	---
Antimony	mg/L	---	---	---	---	---	---	---	---	0.0056		---	---	<0.0055		---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0045		---	---	<0.0045		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.0787	J	---	---	0.0774		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	<0.0084		---	---	<0.0084		---	---
Cadmium	mg/L	0.05	D	---	---	0.0077	D	0.0006	D	0.0043		---	---	0.0048		---	Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	1.8	D	0.2	D	<0.0007		---	---	0.0013		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	0.00066		---	---	0.00075		---	---
Copper	mg/L	0.50	D	---	---	0.050	D	0.029	D	0.0122		---	---	0.0397	J	---	---
Iron	mg/L	---	---	---	---	---	---	---	---	<0.0015		---	---	0.36		---	---
Lead	mg/L	0.1	D	---	---	0.28	D	0.011	D	0.00015		---	---	0.0026		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	0.222		---	---	0.3		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	<0.0001		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	0.0386		---	---	0.0357		---	---
Nickel	mg/L	---	---	---	---	1.5	D	0.17	D	<0.0019		---	---	<0.0024	U	---	---
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.0024		---	---	0.0023		---	---
Silver	mg/L	---	---	---	---	0.035	D	---	---	<0.00004	UJ	---	---	<0.00002		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	<0.00002		---	---	<0.00005		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	0.00078		---	---	0.0017		---	---
Zinc	mg/L	25	D	---	---	0.38	D	0.38	D	1.38		---	---	1.55	J	---	Aquatic Life - Acute, Aquatic Life - Chronic
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	1450		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	2172		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	8		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
- - - = not applicable
T = total
TR = total recoverable
D = dissolved
ND = not detected

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J = The associated value is an estimated quantity.
UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
= Standard is lower than detection limit
= Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

Sample Location: WWC-38.1
Sample Date: 9/20/2006

TABLE 4
WWC-38.1 RESULTS AND COMPARISON TO SURFACE WATER STANDARDS

Parameters and Constituents		Surface Water Standards								Results							
		Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
Name	Units	Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	7.9	---
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20.0	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2740	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	0.156		---	---	0.537		---	Aquatic Life - Chronic
Antimony	mg/L	---	---	---	---	---	---	---	---	<0.0055		---	---	<0.0055		---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0045		---	---	<0.0045		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.0585	J	---	---	0.0578		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	<0.0084		---	---	<0.0084		---	---
Cadmium	mg/L	0.05	D	---	---	0.0077	D	0.0006	D	0.0095		---	---	0.0098		---	Aquatic Life - Acute, Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	1.8	D	0.2	D	<0.0007		---	---	0.0017		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	0.0099		---	---	0.0094		---	---
Copper	mg/L	0.50	D	---	---	0.050	D	0.029	D	0.209		---	---	0.279	J	---	Aquatic Life - Acute, Aquatic Life - Chronic
Iron	mg/L	---	---	---	---	---	---	---	---	<0.0015		---	---	0.0184		---	---
Lead	mg/L	0.1	D	---	---	0.28	D	0.011	D	0.00061		---	---	0.0014		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	1.2		---	---	1.23		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	<0.0001		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	0.0098		---	---	0.0101		---	---
Nickel	mg/L	---	---	---	---	1.5	D	0.17	D	0.0144		---	---	0.0153		---	---
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.0021		---	---	0.0022		---	---
Silver	mg/L	---	---	---	---	0.035	D	---	---	<0.00004	UJ	---	---	<0.00002		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	<0.00004		---	---	<0.00005		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	<0.0007		---	---	<0.0007		---	---
Zinc	mg/L	25	D	---	---	0.38	D	0.38	D	1.72		---	---	1.81	J	---	Aquatic Life - Acute, Aquatic Life - Chronic
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	1600		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	2238		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	<5		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
- - - = not applicable
T = total
TR = total recoverable
D = dissolved
ND = not detected

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J = The associated value is an estimated quantity.
UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
= Standard is lower than detection limit
= Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

Sample Location: BC-1
Sample Date: 9/20/2006

TABLE 5
BC-1 RESULTS AND COMPARISON TO SURFACE WATER STANDARDS

Parameters and Constituents		Surface Water Standards								Results							
		Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
Name	Units	Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	7.7	---
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	16.5	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	437	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	0.01		---	---	0.0177		---	---
Antimony	mg/L	---	---	---	---	---	---	---	---	<0.0055		---	---	<0.0055		---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0045		---	---	<0.0045		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.058	J	---	---	0.0589		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	<0.0202	U	---	---	0.0204		---	---
Cadmium	mg/L	0.05	D	---	---	0.0034	D	0.00035	D	0.00053		---	---	0.00082		---	Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	0.9	D	0.1	D	<0.0007		---	---	0.00084		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	<0.0002		---	---	<0.0002		---	---
Copper	mg/L	0.50	D	---	---	0.022	D	0.014	D	0.0303		---	---	0.0325	J	---	Aquatic Life - Acute, Aquatic Life - Chronic
Iron	mg/L	---	---	---	---	---	---	---	---	0.0448		---	---	0.0766		---	---
Lead	mg/L	0.1	D	---	---	0.11	D	0.0044	D	0.0014		---	---	0.0024		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	0.0567		---	---	0.0574		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	<0.0001		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	0.0075		---	---	0.0073		---	---
Nickel	mg/L	---	---	---	---	0.73	D	0.081	D	<0.0019		---	---	<0.0019		---	---
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.0011		---	---	0.0011		---	---
Silver	mg/L	---	---	---	---	0.0079	D	---	---	<0.00004	UJ	---	---	0.00003		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	<0.00002		---	---	<0.00005		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	0.0019		---	---	0.0019		---	---
Zinc	mg/L	25	D	---	---	0.18	D	0.18	D	0.103		---	---	0.109	J	---	---
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	169		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	282		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	<5		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
- - - = not applicable
T = total
TR = total recoverable
D = dissolved
ND = not detected

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J = The associated value is an estimated quantity.
UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
= Standard is lower than detection limit
= Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

Sample Location: BFT-1
Sample Date: 9/20/2006

TABLE 6
BFT-1 RESULTS AND COMPARISON TO SURFACE WATER STANDARDS

Parameters and Constituents		Surface Water Standards								Results							
		Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
Name	Units	Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	6.3	Livestock Watering, Wildlife Habitat, Aquatic Life - Acute, Aquatic Life - Chronic
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14.3	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	102	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	0.0627		---	---	0.148		---	---
Antimony	mg/L	---	---	---	---	---	---	---	---	<0.0055		---	---	<0.0055		---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0045		---	---	<0.0045		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.0268	J	---	---	0.0272		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	<0.0084		---	---	<0.0084		---	---
Cadmium	mg/L	0.05	D	---	---	0.00048	D	0.00009	D	<0.0001	UJ	---	---	<0.00007	U	---	Standard is lower than detection limit for Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	0.17	D	0.022	D	<0.0007		---	---	<0.0007		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	<0.0002		---	---	<0.0002		---	---
Copper	mg/L	0.50	D	---	---	0.0034	D	0.0025	D	0.021		---	---	0.02	J	---	Aquatic Life - Acute, Aquatic Life - Chronic
Iron	mg/L	---	---	---	---	---	---	---	---	0.0465		---	---	0.0976		---	---
Lead	mg/L	0.1	D	---	---	0.013	D	0.0005	D	0.00017		---	---	0.00027		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	0.0041		---	---	0.0039		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	<0.0001		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	<0.0014		---	---	0.0018		---	---
Nickel	mg/L	---	---	---	---	0.13	D	0.015	D	<0.0019		---	---	<0.0019		---	---
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.00057		---	---	0.00064		---	---
Silver	mg/L	---	---	---	---	0.00025	D	---	---	<0.00004	UJ	---	---	<0.00002		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	<0.00002		---	---	<0.00005		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	<0.0007		---	---	<0.0007		---	---
Zinc	mg/L	25	D	---	---	0.034	D	0.034	D	<0.0019	U	---	---	<0.0035	U	---	---
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	22.9		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	9		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	<5		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
--- = not applicable
T = total
TR = total recoverable
D = dissolved
ND = not detected

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J = The associated value is an estimated quantity.
UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
= Standard is lower than detection limit
= Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

Sample Location: WWC-29.7
Sample Date: 9/20/2006

TABLE 7
WWC-29.7 RESULTS AND COMPARISON TO SURFACE WATER STANDARDS

Parameters and Constituents		Surface Water Standards								Results							
		Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
Name	Units	Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	7.5	---
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	18.3	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1049	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	0.0321		---	---	0.0794		---	---
Antimony	mg/L	---	---	---	---	---	---	---	---	<0.0055		---	---	<0.0055		---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0045		---	---	<0.0045		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.0572	J	---	---	0.0588		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	<0.0084		---	---	<0.0084		---	---
Cadmium	mg/L	0.05	D	---	---	0.0077	D	0.0006	D	0.0013		---	---	0.0016		---	Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	1.8	D	0.2	D	<0.0007		---	---	<0.0007		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	0.0022		---	---	0.0013		---	---
Copper	mg/L	0.50	D	---	---	0.050	D	0.029	D	0.0305		---	---	0.0326	J	---	Aquatic Life - Chronic
Iron	mg/L	---	---	---	---	---	---	---	---	0.007		---	---	0.0253		---	---
Lead	mg/L	0.1	D	---	---	0.3	D	0.011	D	0.0003		---	---	0.00082		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	0.309		---	---	0.312		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	<0.0001		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	0.0075		---	---	0.0089		---	---
Nickel	mg/L	---	---	---	---	1.5	D	0.17	D	<0.0044	U	---	---	<0.0038	U	---	---
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.0024		---	---	0.0017		---	---
Silver	mg/L	---	---	---	---	0.03	D	---	---	<0.00004	UJ	---	---	<0.00002		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	<0.00002		---	---	<0.00005		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	0.00072		---	---	0.00072		---	---
Zinc	mg/L	25	D	---	---	0.38	D	0.38	D	0.21		---	---	0.218	J	---	---
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	515		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	763		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	<5		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
- - - = not applicable
T = total
TR = total recoverable
D = dissolved
ND = not detected

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J = The associated value is an estimated quantity.
UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
XXXX = Standard is lower than detection limit
[ ] = Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

Sample Location: WWC-28.6
Sample Date: 9/20/2006

TABLE 8
WWC-28.6 RESULTS AND COMPARISON TO SURFACE WATER STANDARDS

Parameters and Constituents		Surface Water Standards								Results							
Name	Units	Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
		Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	7.2	---
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	20.4	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2430	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	0.153		---	---	39		---	Aquatic Life - Chronic
Antimony	mg/L	---	---	---	---	---	---	---	---	<0.0055		---	---	<0.0055		---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0045		---	---	<0.0045		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.0564	J	---	---	0.31		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	<0.0084		---	---	<0.0084		---	---
Cadmium	mg/L	0.05	D	---	---	0.0077	D	0.0006	D	0.009		---	---	0.011		---	Aquatic Life - Acute, Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	1.8	D	0.2	D	<0.0007		---	---	0.0174		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	0.0261		---	---	0.048		---	---
Copper	mg/L	0.50	D	---	---	0.050	D	0.029	D	0.144		---	---	0.65	J	---	Aquatic Life - Acute, Aquatic Life - Chronic
Iron	mg/L	---	---	---	---	---	---	---	---	0.0052		---	---	30.8		---	---
Lead	mg/L	0.1	D	---	---	0.28	D	0.011	D	0.00044		---	---	0.0755		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	2.13		---	---	3.12		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	0.00018		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	0.0034		---	---	0.0065		---	---
Nickel	mg/L	---	---	---	---	1.5	D	0.17	D	0.0265		---	---	0.0401		---	---
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.0014		---	---	0.0025		---	---
Silver	mg/L	---	---	---	---	0.035	D	---	---	<0.00004	UJ	---	---	0.00031		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	<0.00002		---	---	0.00022		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	<0.0007		---	---	0.0437		---	---
Zinc	mg/L	25	D	---	---	0.38	D	0.38	D	1.67		---	---	2.04	J	---	Aquatic Life - Acute, Aquatic Life - Chronic
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	1460		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	1952		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	1084		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
- - - = not applicable
T = total
TR = total recoverable
D = dissolved
ND = not detected

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J = The associated value is an estimated quantity.
UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
= Standard is lower than detection limit
= Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

Sample Location: Grunderud-1
Sample Date: 9/21/2006

TABLE 9
GRUNERUD-1 RESULTS AND COMPARISON TO SURFACE WATER STANDARDS

Parameters and Constituents		Surface Water Standards								Results							
Name	Units	Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
		Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	4.6	Livestock Watering, Wildlife Habitat, Aquatic Life - Acute, Aquatic Life - Chronic
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	22.7	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3110	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	14		---	---	14.2		---	Aquatic Life - Acute, Aquatic Life - Chronic
Antimony	mg/L	---	---	---	---	---	---	---	---	<0.016	UJ	---	---	<0.0145	UJ	---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0051		---	---	<0.0051		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.0755	J	---	---	0.0727		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	0.137		---	---	0.142		---	---
Cadmium	mg/L	0.05	D	---	---	0.0077	D	0.00064	D	0.0272		---	---	0.0278		---	Aquatic Life - Acute, Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	1.8	D	0.2	D	<0.0004		---	---	<0.0004		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	0.181		---	---	0.176		---	---
Copper	mg/L	0.50	D	---	---	0.050	D	0.029	D	1.22		---	---	1.35		---	Livestock Watering, Aquatic Life - Acute, Aquatic Life - Chronic
Iron	mg/L	---	---	---	---	---	---	---	---	0.0169		---	---	0.0206		---	---
Lead	mg/L	0.1	D	---	---	0.28	D	0.011	D	0.0057		---	---	0.0056		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	10.2		---	---	10.4		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	<0.0001		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	0.0057		---	---	0.0051		---	---
Nickel	mg/L	---	---	---	---	1.5	D	0.17	D	0.143		---	---	0.138		---	---
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.0055		---	---	0.003		---	---
Silver	mg/L	---	---	---	---	0.035	D	---	---	0.00006	J	---	---	0.00008		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	<0.00004		---	---	<0.00005		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	<0.0004		---	---	0.00059		---	---
Zinc	mg/L	25	D	---	---	0.38	D	0.38	D	5.84		---	---	5.54		---	Aquatic Life - Acute, Aquatic Life - Chronic
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	1820		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	2858		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	14		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
- - - = not applicable
T = total
TR = total recoverable
D = dissolved
ND = not detected

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J = The associated value is an estimated quantity.
UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
= *Standard is lower than detection limit*
= Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

Sample Location: BRANCH
Sample Date: 9/21/2006

TABLE 10
B-RANCH RESULTS AND COMPARISON TO SURFACE WATER RESULTS

Parameters and Constituents		Surface Water Standards								Results							
		Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
Name	Units	Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	4.2	Livestock Watering, Wildlife Habitat, Aquatic Life - Acute, Aquatic Life - Chronic
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	21.1	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3200	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	28.8		---	---	28.9		---	Aquatic Life - Acute, Aquatic Life - Chronic
Antimony	mg/L	---	---	---	---	---	---	---	---	<0.0175	UJ	---	---	<0.0144	UJ	---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0051		---	---	<0.0051		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.0496	J	---	---	0.0534		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	0.15		---	---	0.144		---	---
Cadmium	mg/L	0.05	D	---	---	0.0077	D	0.00064	D	0.0342		---	---	0.0343		---	Aquatic Life - Acute, Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	1.8	D	0.2	D	0.00042		---	---	<0.0004		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	0.334		---	---	0.366		---	---
Copper	mg/L	0.50	D	---	---	0.050	D	0.029	D	2.34		---	---	2.43		---	Livestock Watering, Aquatic Life - Acute, Aquatic Life - Chronic
Iron	mg/L	---	---	---	---	---	---	---	---	0.0154		---	---	0.0245		---	---
Lead	mg/L	0.1	D	---	---	0.28	D	0.011	D	0.008		---	---	0.0082		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	15.9		---	---	16.2		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	<0.0001		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	0.0052		---	---	0.0049		---	---
Nickel	mg/L	---	---	---	---	1.5	D	0.17	D	0.204		---	---	0.219		---	Aquatic Life - Chronic
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.0062		---	---	0.0041		---	---
Silver	mg/L	---	---	---	---	0.035	D	---	---	0.00009	J	---	---	0.00011		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	<0.00004		---	---	<0.00005		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	0.00068		---	---	0.00048		---	---
Zinc	mg/L	25	D	---	---	0.38	D	0.38	D	7.89		---	---	7.88		---	Aquatic Life - Acute, Aquatic Life - Chronic
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	1770		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	3002		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	<5		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
--- = not applicable
T = total
TR = total recoverable
D = dissolved
ND = not detected

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J = The associated value is an estimated quantity.
UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
= Standard is lower than detection limit
= Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

Sample Location: WWC-H180
Sample Date: 9/21/2006

TABLE 11
WWC-H180 RESULTS AND COMPARISON TO SURFACE WATER STANDARDS

Parameters and Constituents		Surface Water Standards								Results							
		Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
Name	Units	Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	5.9	Livestock Watering, Wildlife Habitat, Aquatic Life - Acute, Aquatic Life - Chronic
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	21.3	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1326	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	0.476		---	---	1.88		---	Aquatic Life - Chronic
Antimony	mg/L	---	---	---	---	---	---	---	---	<0.0117	U	---	---	<0.0128	U	---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0051		---	---	<0.0051		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.0729	J	---	---	0.0787		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	0.0569		---	---	0.059		---	---
Cadmium	mg/L	0.05	D	---	---	0.0077	D	0.0006	D	0.0106		---	---	0.0107		---	Aquatic Life - Acute, Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	1.8	D	0.2	D	<0.0004		---	---	0.00043		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	0.0817		---	---	0.0871		---	---
Copper	mg/L	0.50	D	---	---	0.050	D	0.029	D	0.481		---	---	0.537		---	Aquatic Life - Acute, Aquatic Life - Chronic
Iron	mg/L	---	---	---	---	---	---	---	---	<0.014		---	---	<0.014		---	---
Lead	mg/L	0.1	D	---	---	0.28	D	0.011	D	0.00013		---	---	<0.00013		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	6.12		---	---	6.1		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	<0.0001		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	0.0041		---	---	0.0052		---	---
Nickel	mg/L	---	---	---	---	1.5	D	0.17	D	0.15		---	---	0.159		---	---
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.0024		---	---	0.0019		---	---
Silver	mg/L	---	---	---	---	0.035	D	---	---	<0.00002	UJ	---	---	<0.00002		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	0.00005		---	---	<0.00005		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	0.00094		---	---	0.00084		---	---
Zinc	mg/L	25	D	---	---	0.38	D	0.38	D	1.6		---	---	1.63		---	Aquatic Life - Acute, Aquatic Life - Chronic
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	725		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	1190		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	8		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
- - - = *not applicable*
T = total
TR = total recoverable
D = dissolved
ND = not detected

U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J = The associated value is an estimated quantity.
UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
[:::] = *Standard is lower than detection limit*
[ ] = Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

Sample Location: LWWC-1
Sample Date: 9/22/2006

TABLE 12
LWWC-1 RESULTS AND COMPARISON TO SURFACE WATER STANDARDS

Parameters and Constituents		Surface Water Standards								Results							
Name	Units	Livestock Watering		Wildlife Habitat		Aquatic Life				Dissolved Results		Total Results		Total Recoverable Results		Field Parameters	Use Exceeded
						Acute		Chronic									
		Standard	Fraction	Standard	Fraction	Standard	Fraction	Standard	Fraction	Value	Qualifier	Value	Qualifier	Value	Qualifier		
Field																	
pH	s.u.	6.6-9	T	6.6-9	T	6.6-9	T	6.6-9	T	---	---	---	---	---	---	5.0	Livestock Watering, Wildlife Habitat, Aquatic Life - Acute, Aquatic Life - Chronic
Temperature	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	18.1	---
Specific Conductance	µS/cm	---	---	---	---	---	---	---	---	---	---	---	---	---	---	744	---
Metals																	
Aluminum	mg/L	---	---	---	---	0.75	D	0.087	D	0.726		---	---	1.5		---	Aquatic Life - Chronic
Antimony	mg/L	---	---	---	---	---	---	---	---	<0.0092	U	---	---	<0.0129	U	---	---
Arsenic	mg/L	0.2	D	---	---	0.34	D	0.15	D	<0.0051		---	---	<0.0051		---	---
Barium	mg/L	---	---	---	---	---	---	---	---	0.0357	J	---	---	0.034		---	---
Boron	mg/L	5	D	---	---	---	---	---	---	0.0388		---	---	0.039		---	---
Cadmium	mg/L	0.05	D	---	---	0.0067	D	0.00058	D	0.0052		---	---	0.0052		---	Aquatic Life - Chronic
Chromium	mg/L	1	D	---	---	1.6	D	0.2	D	<0.0004		---	---	<0.0004		---	---
Cobalt	mg/L	1	D	---	---	---	---	---	---	0.0609		---	---	0.0577		---	---
Copper	mg/L	0.50	D	---	---	0.043	D	0.026	D	0.554		---	---	0.557		---	Livestock Watering, Aquatic Life - Acute, Aquatic Life - Chronic
Iron	mg/L	---	---	---	---	---	---	---	---	<0.014		---	---	<0.014		---	---
Lead	mg/L	0.1	D	---	---	0.24	D	0.0095	D	0.0001		---	---	<0.00013		---	---
Manganese	mg/L	---	---	---	---	---	---	---	---	2.31		---	---	2.34		---	---
Mercury	mg/L	0.01	D	0.00077	T	0.0014	D	0.00077	D	<0.0001		---	---	<0.0001		---	---
Molybdenum	mg/L	---	---	---	---	---	---	---	---	0.0031		---	---	0.0032		---	---
Nickel	mg/L	---	---	---	---	1.3	D	0.15	D	0.0547		---	---	0.0523		---	---
Selenium	mg/L	0.05	D	0.005	TR	0.02	TR	0.005	TR	0.0015		---	---	0.00091		---	---
Silver	mg/L	---	---	---	---	0.027	D	---	---	<0.00002	UJ	---	---	<0.00002		---	---
Thallium	mg/L	---	---	---	---	---	---	---	---	0.00004		---	---	<0.00005		---	---
Vanadium	mg/L	0.10	D	---	---	---	---	---	---	<0.0004		---	---	0.00068		---	---
Zinc	mg/L	25	D	---	---	0.34	D	0.34	D	0.901		---	---	0.872		---	Aquatic Life - Acute, Aquatic Life - Chronic
Physical Properties																	
Hardness	mg/L	---	---	---	---	---	---	---	---	---	---	---	---	347		---	---
Total Dissolved Solids	mg/L	---	---	---	---	---	---	---	---	---	---	589		---	---	---	---
Total Suspended Solids	mg/L	---	---	---	---	---	---	---	---	---	---	6		---	---	---	---

Notes:
s.u. = standard units
°C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
ml = milliliters
- - - = not applicable
T = total
TR = total recoverable
D = dissolved
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U = The analyte was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
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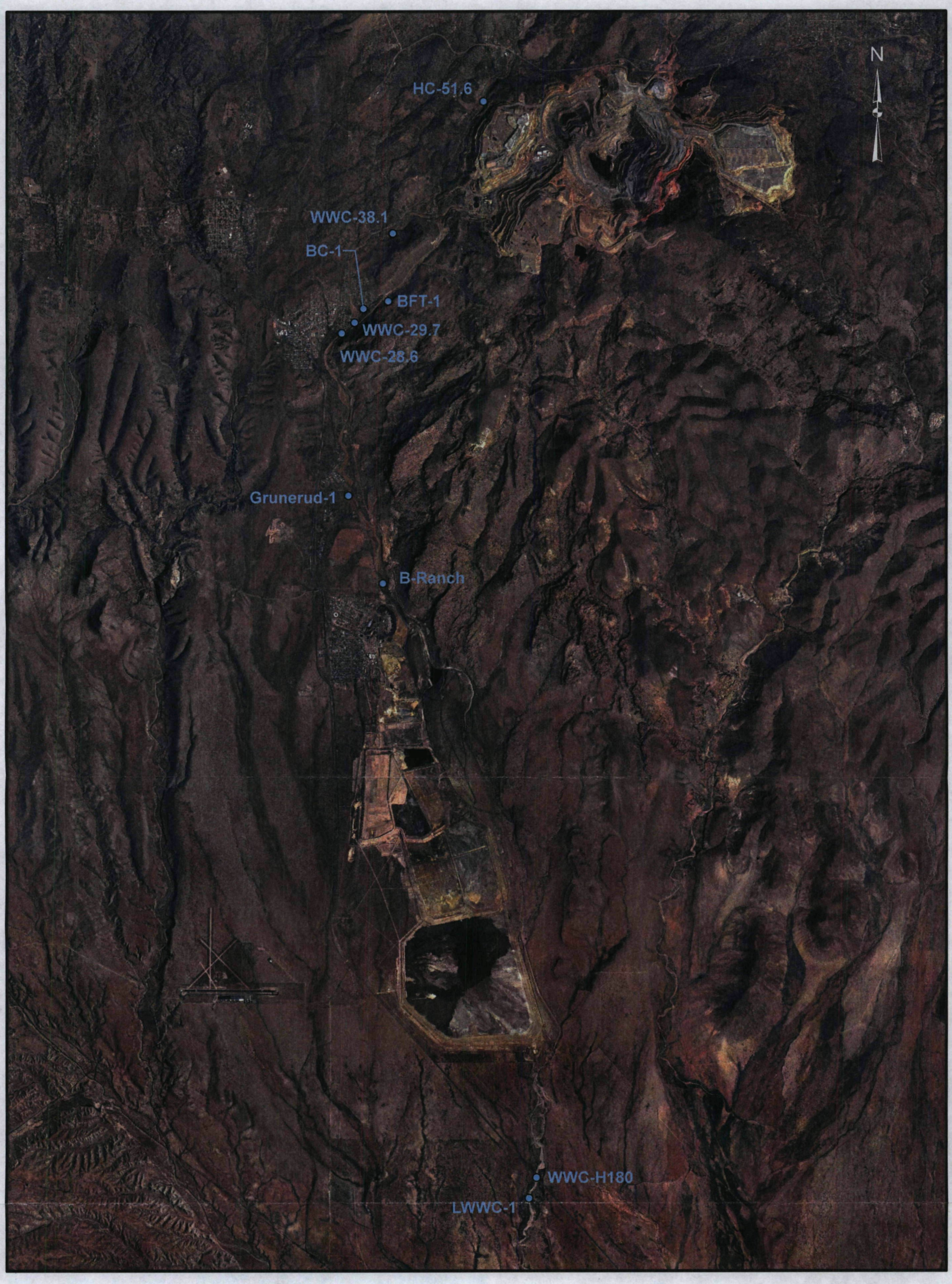
R = The data are unusable. (Note: Analyte may or may not be present.)

* = No designated uses exceeded
= Standard is lower than detection limit
= Exceedances (except for pH)
New Mexico state pH standards correspond to ranges, therefore values outside of the requirements are highlighted.

FIGURE



LEGEND

- September 2006 Surface Water Sample Locations

10,000 0 10,000

SCALE 1:82,500 FEET

REFERENCE

1) Projection: Transverse Mercator Datum: NAD 83 Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet.
2) 2005 New Mexico Digital Orthophotograph Provided by Earth Data Analysis Center (EDAC), In UTM NAD 83 Projection, 1 Meter Resolution.

PROJECT

SUMMER RAINFALL POOL SAMPLING
H/WCIUs

TITLE

Sample Locations

Golder Associates
Tucson, Arizona

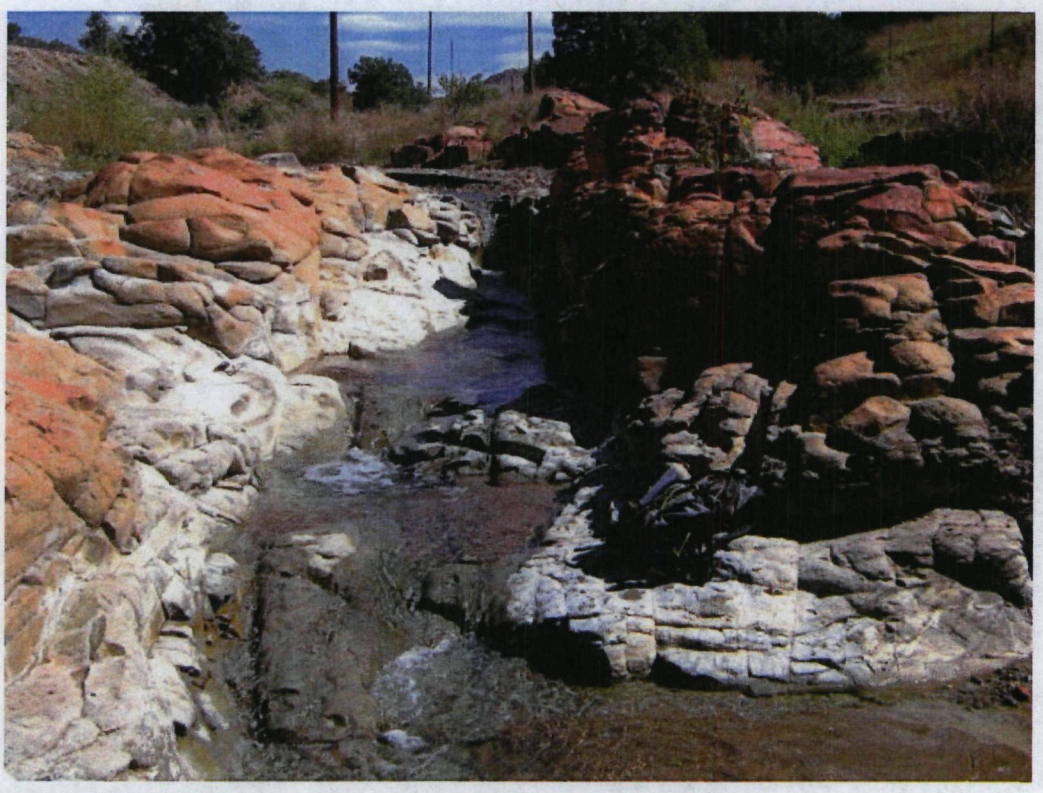
PROJECT No. 953-1072-037.3			SCALE AS SHOWN	REV. 0
DESIGN	---	---	FIGURE 1	
GIS	MM	12/20/2006		
CHECK	KJ	1/11/2007		
REVIEW	KJ	1/11/2007		

Project: L:\2007\0739255306\MXDs\0739255306F01.mxd - Plot: L:\2007\0739255306\Export\Figures\20070713\0739255306F01.pdf

APPENDIX A

SUMMER RAINFALL POOL PHOTOGRAPHS

Photograph 1: Hanover Creek, Station -51.6. (9/20/2006).



Photograph 2: Whitewater Creek, Station -38.1. (9/20/2006).

Photograph 3: Bayard Canyon. (9/20/2006).

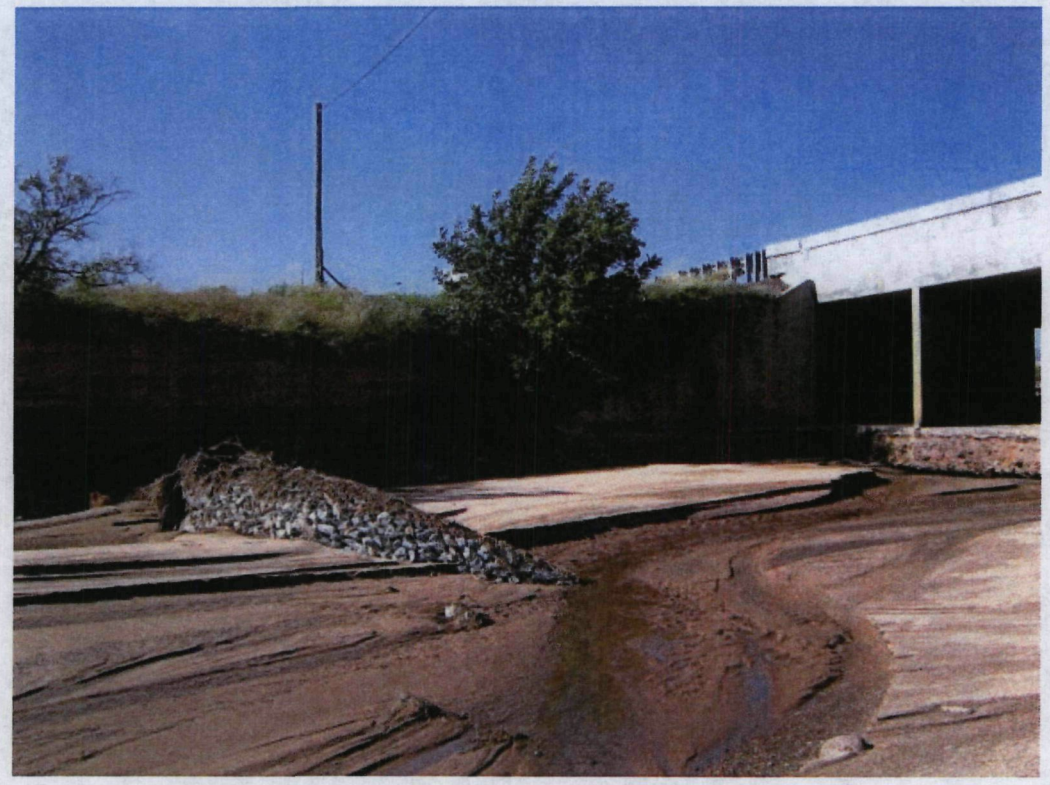
Photograph 4: Bayard Falls Tributary. (9/20/2006).

Photograph 5: Whitewater Creek, Station -29.7. (9/20/2006).

Photograph 6: Whitewater Creek, Station -28.6. (9/20/2006).

Photograph 7: Grunerud-1, Whitewater Creek, Station 16.0. (9/21/2006).

Photograph 8: B-Ranch, Whitewater Creek, Station 12.0. (9/21/2006).



Photograph 9: Whitewater Creek at Highway 180. (9/21/2006).

Photograph 10: Lower Whitewater Creek. (9/21/2006).

APPENDIX B

DATA VALIDATION REPORT
(URS WORK PRODUCT)

Final REPORT

DATA VALIDATION REPORT FOR SURFACE WATER SAMPLING

Prepared for
Chino Mines Company
Hurley, New Mexico

January 15, 2007

URS

URS Corporation
8181 East Tufts Avenue
Denver, Colorado 80237

Project No. 2223900 Task 02201

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1. INTRODUCTION

This report contains the results of the data validation conducted for the surface water samples collected for the Surface Water Investigation. The data were generated and reviewed in accordance with the approved Quality Assurance Plan (QAP) prepared by Chino Mines Company and Steffen, Robertson and Kirsten (U.S.), Inc. (March 1997)

The samples were collected in September 2006. The samples were sent to SVL Analytical, Inc. in Kellog, Idaho for analysis. The samples were analyzed for total recoverable and dissolved metals by Method ILM05.3, total dissolved solids (TDS) by EPA Method 160.1, and total suspended solids (TSS) by EPA Method 160.2. Results of the data validation performed on samples reported in these packages are presented in Sections 4 and 5.1 and 5.2 of this report.

Table 1-1 lists the samples for which data were validated, the corresponding data package, and the review narrative section in which validation results are presented. The cross reference to the laboratory identification can be found in each of the review sections.

TABLE 1-1
DATA PACKAGE AND SAMPLE IDENTIFICATION SUMMARY

Data Package	Report Section[1]	Field Sample Identification
125528	4 and 5.1	GRUNERUD-1
		B-RANCH
		GAI-1
		WWC-H180
		LWWC-1
		GRUNERUD-1 (DIS)
		B-RANCH (DIS)
		GAI-1 (DIS)
		WWC-H180 (DIS)
		LWWC-1 (DIS)
125480	5.2	HC-51.6
		WWC-38.1
		BC-1
		BFT-1
		WWC-29.7
		WWC-28.6
		HC-51.6 (DIS)
		WWC-38.1 (DIS)
		BC-1 (DIS)
		BFT-1 (DIS)
		WWC-29.7 (DIS)
		WWC-28.6 (DIS)

[1] Data package 125528 was used to evaluate both laboratory performance criteria (Section 4) and sample specific criteria (Section 5).

This data validation report describes the data validation process used and presents the data review results for the soil and water samples and associated quality control (QC) sample analyses.

In accordance with the QAP, a review of all data was conducted independently of the laboratory. The review consisted of evaluation of laboratory performance criteria and sample-specific criteria using guidance from the USEPA National Functional Guidelines for Inorganic Data Review (February 1994). The laboratory performance criteria evaluated included: initial calibration procedures and results, continuing calibration procedures and results, inductively coupled plasma (ICP) interference check sample results, contract required detection limit (CRDL) standard analysis and results, laboratory control sample results, and result quantitation and verification. An evaluation of laboratory performance criteria was conducted on at least 10% of the data

set per analysis type. Section 2 and Tables 2-1 and 2-2 provide the QC requirements for the laboratory performance criteria.

The sample-specific criteria evaluated included: COC and sample receipt documentation, holding times, blank contamination, duplicate sample analysis, matrix spike/matrix spike duplicate sample analysis, serial dilution results, post digestion spike recovery, and field duplicate results agreement as applicable to the method. The sample specific criteria were evaluated for every data package received. Section 3 and Table 3-1 summarize the sample-specific criteria that were used in the data validation process and how data were qualified.

Section 4 presents the results of the evaluation of laboratory performance criteria. The review of sample-specific criteria is presented in Section 5. The results obtained for field quality control samples are discussed in Section 6 and an overall assessment of data, with respect to the data quality indicators, is presented in Section 7.

During the data validation process, the data reviewer annotated on the analytical data sheets any data validation qualifiers assigned ("U", "J", "UJ", and "R") and associated qualifier and bias codes as listed in Tables 1-2 and 1-3. The purpose of the qualifier codes is to provide information with regard to the data quality condition(s) that resulted in the assigned qualifiers. The bias code provides an indication of the bias direction of the results qualified as estimated based on data quality condition(s) that resulted in the data qualification and the results of the other associated quality control analyses. The data qualifier codes are followed by a hyphen and the applicable bias code. For example, a result qualified as estimated due to a holding time exceedance, which resulted in a potential low bias in the result, has the following code annotated on the data sheet, "HT-L." In the case of multiple data quality conditions resulting in qualification, each qualifier code is listed and separated by a comma. For example, a result qualified as estimated due to low matrix spike recovery and poor method duplicate precision would have the following codes annotated on the data sheet, "MS, D – I. The data reporting forms with assigned data qualifiers are included in Appendix A.

TABLE 1-2
DATA VALIDATION QUALIFIER DEFINITIONS

Qualifier	Definitions[1]
U	The analyte was analyzed for, but was not detected above the level of the associated value. The associate value is either the sample quantitation limit or the sample detection limit.
J	The associated value is an estimated quantity.
UJ	The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The data are unusable. (Note: Analyte may or may not be present.)

[1] USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, February 1994.

TABLE 1-3
DATA VALIDATION QUALIFIER CODES

Qualifier Code	Data Quality Condition Resulting In Assigned Qualification
General use	
HT	Holding time requirement was not met
MB or PB	Method blank or preparation blank contamination
LCS	Laboratory control sample evaluation criteria not met
RB	Rinsate blank contamination
FD	Field duplicate evaluation criteria not met
P	Preservation requirement was not met
RL	Reporting limit exceeds decision criteria (for nondetects)
Inorganic methods	
ICV	Initial calibration verification evaluation criteria not met
CCV	Continuing calibration verification evaluation criteria not met
CCB	Continuing calibration blank contamination
PB	Preparation blank contamination
ICS	Interference check sample evaluation criteria not met
LD	Laboratory duplicate precision evaluation criteria not met
MS and/or MSD	Matrix spike and/or matrix spike duplicate recovery outside acceptance range
PDS	Post-digestion spike recovery outside acceptance range
MSA	Method of standard additions correlation coefficient ≤ 0.995
D	Duplicate precision evaluation criteria not met
IS	Internal standard recovery outside acceptance range for ICP-MS
ICS	Interferent check solution evaluation criteria not met
SD	Serial dilution results did not meet evaluation criteria
CRDL	Contract Required Detection Limit standard recovery not met
CE	Counting error
Bias Codes	**Bias Direction**
H	Bias in sample result likely to be high
L	Bias in sample result likely to be low
I	Bias in sample result is indeterminate

2. EVALUATION OF LABORATORY PERFORMANCE CRITERIA

The review of laboratory performance criteria is summarized in Tables 2-1 and 2-2. Table 2-1 is pertinent to method ILM05.3, metals determination by ICP and ICP-MS. Table 2-2 is pertinent to method ILM05.3, metals determination by graphite furnace atomic absorption (GFAA). Laboratory performance criteria was evaluated for one of the packages. The results of the laboratory performance criteria review are presented in Section 4.

TABLE 2-1
LABORATORY PERFORMANCE CRITERIA – ILM05.3 (ICP/ICP-MS)

Method	QC Check	Minimum Frequency	Acceptance Criteria	Qualifiers
ILM05.3 (ICP /ICPMS)	Initial calibration (minimum 1 standard and a blank)	Daily prior to sample analysis	• Correlation Coefficient ≥0.995 for linear regression.	• If r <0.995, qualify all results as estimated (J/UJ).
	Second source initial calibration verification (ICV)	Daily after initial calibration	• All analytes within ±10% of expected value. • RSD of replicate integrations <5%.	• If %R falls outside the acceptance range but within range of 75-89% or 111-125%, qualify results >IDL as estimated (J). • If %R is within 111-125%, results <IDL are acceptable. • If %R is 75-89%, qualify results <IDL as estimated (UJ). • If %R is <75%, qualify all results as unusable (R). • If %R is >125%, qualify results >IDL as unusable (R); results <IDL are acceptable without qualification. • No qualification issued for RSD >5%.
	Continuing calibration verification (CCV)	After every 10 samples and at the end of the analysis sequence	• All analytes within ±10% of expected value. • RSD of replicate integrations <5%.	
	Linear Range Analysis (LRA)	Quarterly	• All analytes agree within 5% of true value.	• NA
	Contract Required Detection Limit (CRDL) standard	At beginning and end of each sample analysis	• None	• Professional judgment will be used for the need for qualification for %Rs outside 50-150% based on the relative concentration of the CRDL standard and the sample concentration.
	Interference check solution (ICS)	At the beginning and end of the analytical run	• Recovery of spiked analytes within ±20% of expected value. • Results for analytes not present in the ICS solution must be <RL.	• If %R is >120%, results <IDL are acceptable. • If %R is >120%, qualify results >IDL as estimated (J). • If %R is within 50-79%, qualify results >IDL as estimated (J). • If %R is within 50-79%, qualify results <IDL as estimated (UJ). • If %R is <50%, qualify all results as unusable (R). • If results > IDL are observed that are not present in the ICS solution and the sample has concentrations at the level of the interferents concentrations, qualify sample results >IDL as estimated (J) if the amount of bias is ≥25% of sample result. • If negative concentrations are observed that are not present in the ICS solution at a concentration where the absolute value is >IDL, qualify sample results as estimated (J/UJ) if the bias is more than 25% of the reported result and the sample has a concentration comparable to the interferent concentrations in the ICS solution.
	Laboratory Control Sample (LCS) (aqueous)	One per analytical batch containing aqueous samples	• 80-120% recovery for water samples.	• If %R is within 50-79% or >120%, qualify results >IDL as estimated (J). • If %R >120%, results <IDL are acceptable without qualification. • If %R is within 50-79%, qualify results <IDL as estimated (J/UJ) • If %R is <50%, qualify all results as unusable (R).
	Laboratory Control Sample (LCS) (solid)	One per analytical batch containing solid samples	• LCS results must fall within the control limits established by the EPA.	• If LCS recovery falls outside the control limits, qualify results >IDL as estimated (J). • If LCS recovery is > control limits, results <IDL are acceptable without qualification. • If LCS recovery is>50 % and < control limits, qualify results <IDL as estimated (J/UJ). • If %R is <50%, qualify all results as unusable (R).

TABLE 2-2
LABORATORY PERFORMANCE CRITERIA – ILM04.0 (GFAA)

Method	QC Check	Minimum Frequency	Acceptance Criteria	Qualifiers
ILM05.3 (GFAA)	Initial calibration (minimum 3 standards and a blank)	Daily prior to sample analysis	• Correlation Coefficient ≥0.995 for linear regression.	• If r <0.995, qualify all results as estimated (J/UJ).
	Second Source initial calibration verification (ICV)	Daily after initial calibration	• All analytes within ±10% of expected value.	• If %R falls outside the acceptance range but within range of 75-89% or 111-125%, qualify results >IDL as estimated (J). • If %R is within 111-125%, results <IDL are acceptable. • If %R is 75-89%, qualify results <IDL as estimated (UJ).
	Continuing calibration verification (CCV)	After every 10 samples and at the end of the analysis sequence		• If %R is <75%, qualify all results as unusable (R). • If %R is >125%, qualify results >IDL as unusable (R); results <IDL are acceptable without qualification.
	Contract Required Detection Limit (CRDL) standard	At beginning and end of each sample analysis	None	• Professional judgment will be used for the need for qualification for %Rs outside 50-150% based on the relative concentration of the CRDL standard and the sample concentration.
	Laboratory Control Sample (LCS) (aqueous)	One per analytical batch containing aqueous samples	• 80-120% recovery for water samples	• If %R is within 50-79% or >120%, qualify results >IDL as estimated (J). • If %R >120%, results <IDL are acceptable without qualification. • If %R is within 50-79%, qualify results <IDL as estimated (J/UJ) • If %R is <50%, qualify all results as unusable (R).
	Laboratory Control Sample (LCS) (solid)	One per analytical batch containing solid samples	• LCS results must fall within the control limits established by the EPA.	• If LCS recovery falls outside the control limits, qualify results >IDL as estimated (J). • If LCS recovery is > control limits, results <IDL are acceptable without qualification. • If LCS recovery is>50 % and < control limits, qualify results <IDL as estimated (J/UJ). • If %R is <50%, qualify all results as unusable (R).

3. EVALUATION OF SAMPLE-SPECIFIC CRITERIA

Sample-specific criteria were reviewed for all data packages. The review criteria and resultant actions are summarized in Table 3-1. The results of the sample-specific review are detailed in Section 5. Each subsection of Section 5 presents the review narrative for one data package.

TABLE 3-1
SAMPLE-SPECIFIC CRITERIA

Method	QC Check	Minimum Frequency	Acceptance Criteria	Qualifiers
ICP ICPMS*	Holding Time	Each Sample	• Analysis within the holding time requirements specified in the QAPP. • No holding time was specified in the QAPP for pH. The reviewer used a holding time of 2 days for sediment samples.	• If sample was analyzed outside the holding time requirements, then the sample results were qualified as estimated (J/UJ).
	Continuing calibration blank (CCB)	After every calibration verification	• <RL for positive results. • <RL for |negative results|.	• Sample results, for an analyte detected in an associated blank at a concentration, <5x the blank concentration, qualify as nondetect (U). • Sample results for an analyte reported in an associated blank at a negative concentration < |4x blank concentration|, qualify results as estimated (J/UJ).
	Method Blank	One per analytical batch	• No analytes detected ≥ RL.	• Sample results, for an analyte detected in the method blank at a concentration, <5x the blank concentration, qualify as nondetect (U). • Sample results for an analyte reported in the method blank at a negative concentration < |4x blank concentration|, qualify results as estimated (J/UJ).
	ICP Serial Dilution Test	One per analytical batch	• 1:5 dilution must agree within ±10% of the original determination for analytes present at concentrations >50x MDL.	• If %D is >10%, qualify associated data as estimated (J/UJ).
	Matrix Spike (MS)	One per 20 samples	• Recovery within 75-125% for both water and soils. • If sample result is ≥4x the spike amount then the matrix spike is not an appropriate for assessing accuracy measurement.	• If % R is >125%, results <IDL are acceptable without qualification. • If %R is >125% or <75%, qualify results >IDL as estimated (J). • If % R is within 30-74%, qualify results <IDL as estimated (J/UJ). • If % R is <30%, qualify results <IDL as unusable(R).
	Laboratory Duplicate or Matrix Spike Duplicate	One per 20 samples	If both results >5x RL • RPD for water is ≤20%. • RPD for soils is ≤35%. If either sample result is <5x the RL then • Absolute difference ≤1x RL (waters). • Absolute difference ≤2x RL (soils).	• If the RPD or absolute difference falls outside the appropriate fixed control windows, qualify the results for that analyte as estimated (J/UJ).

TABLE 3-1
SAMPLE-SPECIFIC CRITERIA

Method	QC Check	Minimum Frequency	Acceptance Criteria	Qualifiers
	Field Duplicate		If both results >5x RL • RPD for soils is ≤50%. If either sample result is <5x then • Absolute difference ≤ 3x RL.	• If the RPD or absolute difference fall outside the appropriate fixed control windows, qualify the results for that analyte as estimated (J/UJ).
	Post-digestion spike (PDS) ILM05.3 (ICP)	Typically, when the MS failed or at analyst discretion	• Recovery within 75-125% for both water and soils. • If sample result is ≥4x the spike amount then the PDS is not an appropriate for assessing accuracy measurement.	• No qualification was issued. • Post-digestion spikes were conducted to aid in determining whether the MS results that were out of acceptance limits were caused by the sample matrix, a bias in the analytical system, or a combination of both.
	Post-digestion spike (PDS) ILM05.3 (GFAA)	Minimally, 1 per batch if serial dilution fails. Alternately, at analyst discretion, on every sample.	• Recovery within 85-115%.	• If %R is <40%, dilute sample and repeat once. • If %R is still <40%, qualify data as estimated (J/UJ). • If sample absorbance or concentration is <50% of the spike absorbance or concentration and %R is <85% or >115%, qualify result as estimated (J/UJ). • If sample absorbance or concentration is <50% of the spike absorbance or concentration and %R is 85-115%, no qualification is required. • If sample absorbance or concentration is >50% of the spike absorbance or concentration and %R is <85% or >115, then quantitate the sample result using MSA.
	MSA ILM05.3 (GFAA)		• Correlation coefficient ≥0.995	• If the correlation coefficient is <0.995, qualify result as estimated (J/UJ).

*As applicable to the method.

4. REVIEW OF LABORATORY PERFORMANCE EVALUATION CRITERIA

Data package 125528 was used to evaluate the laboratory performance criteria. The data reported in this data packages accounted for greater than 10% of the investigation water data. The evaluation of laboratory performance criteria was conducted as summarized in Tables 2-1 and 2-2.

4.1 Initial Calibration

ICP – Each ICP analytical run was initiated with the analysis of a blank and at least one standard, which satisfied the initial calibration criterion. All metals in the second source ICV standard were recovered within the acceptance range of 90-110% for all ICV analyses. Several target analytes were detected in the initial calibration blank sample. No samples were analyzed directly after the initial calibration blank and before the first calibration blank. Therefore, data qualification for ICP metals data was not necessary based on the initial calibration.

ICPMS – Each ICPMS analytical run was initiated with a blank and at least five standards. The calibrations were verified with the analysis of an ICV. All metals were recovered within the acceptance range of 90-110%. Several target analytes were detected in the initial calibration blank sample. No samples were analyzed directly after the initial calibration blank and before the first calibration blank. Because all response criteria were met, data qualification on the basis of initial calibration was not necessary.

4.2 Continuing Calibration Verification

The continuing calibration verification solutions (CCV) were analyzed at the required frequency for all methods. All continuing calibration criteria were satisfied and data qualification was not necessary.

4.3 Interference Check Sample (ICS) for Metals

The frequency of analysis of the ICS A and ICS AB standards was acceptable. The percent recoveries for all analytes present in the ICS AB solution were within the acceptance range of 80-120%.

For each metals package evaluated, results for a few analytes not present in the ICS A standard solution were reported with absolute values greater than the instrument detection limit (IDL).

All of the samples reported in this data package contained concentrations of interferent elements approaching the concentrations present in the ICS A and ICS AB. The table below lists the analytes detected in the ICS A with absolute values greater than the IDL and any qualification issued.

Analyte	ICSA (Initial) (µg/l)	Data Qualification
Antimony	-38	The antimony results for samples GRUNERUD-1, b-RANCH, GAI-1, GRUNERUD-1 (DIS). B-RANCH (DIS), and GAI-1 (DIS) were qualified as estimated (J/UJ) to reflect the potential low bias.
Arsenic	30	None. All sample results were reported at concentrations greater than four times the absolute value of the amount found in the ICS A or reported as nondetect.
Zinc	22	

Results in µg/l. To determine equivalent soil value in mg/kg, multiply by the preparation factor of 0.1.

If samples contained concentrations of interferent elements in other data packages approaching the concentrations present in the ICS A and ICS AB, then the results are discussed in the individual review narratives presented in Section 5.

4.4 Laboratory Control Samples (LCS)

Laboratory control samples were prepared with each batch of samples. The recoveries for all analytes were within the control limits reported on the forms. Therefore, data qualification based on LCS results was not necessary.

4.5 CRDL Standard (Metals)

A CRDL standard (a low standard with concentrations at the laboratory reporting limit) was analyzed at the proper location in each analytical sequence.

For each metals data package, the CRDL standard for each analyte was evaluated to determine if the recovery was outside the acceptance range of 50-150%. None of the CRDL recoveries reported in this data package were outside the acceptance range of 50-150%. If the CRDL recoveries were outside 50-150% in other data packages, then the results are discussed in the individual review narratives presented in Section 5.

4.6 Tune (ICPMS)

The tuning solution was analyzed at the beginning of every 12 hours of sample analysis. The relative standard deviations were all < 5% for all analytes contained in the tuning solution and the resolution and mass calibration of the instrument were also within the required acceptance ranges. Data qualification on the basis of instrument tuning was not necessary.

4.7 Sample Quantitation and Result Verification

Sample quantitation was checked by recalculating a minimum of 10% of the reported sample results from the raw system printouts. Examples of calculated results included correlation coefficients, reported sample results, percent differences for serial dilutions, recoveries for calibration standards, and RPDs between duplicate results. No calculation or reporting errors were found.

5. REVIEW OF SAMPLE SPECIFIC CRITERIA FOR ALL DATA PACKAGES

Sample-specific criteria were evaluated for all data packages. The evaluation of sample-specific criteria was conducted as summarized in Table 3-1. The data review narratives for the three data packages are presented in Subsections 5.1 through 5.2.

5.1 SVL Data Package 125528

Data package 125528 contained the analytical results for five total recoverable and dissolved samples. The table below lists the laboratory IDs, corresponding field IDs, and QC designations.

Laboratory ID	Field ID	QC Designation
W538268	GRUNERUD-1	MS/MD/PDS
W538269	B-RANCH	
W538270	GAI-1	FD to sample GRUNERUD-1
W538271	WWC-H180	
W538272	LWWC-1	
W538273 (DIS)	GRUNERUD-1 (DIS)	MS/MD/PDS
W538274 (DIS)	B-RANCH (DIS)	
W538275 (DIS)	GAI-1 (DIS)	FD to sample GRUNERUD-1 (DIS)
W538276 (DIS)	WWC-H180 (DIS)	
W538277 (DIS)	LWWC-1 (DIS)	

MD – Method Duplicate MS – Matrix Spike FD – Field Duplicate
SD – Serial Dilution PDS – Post-Digestion Spike

5.1.1 Overall Assessment

The data are considered usable for meeting project objectives with the qualifications noted in the following narrative. The data qualifiers and associated qualifier and bias codes were hand-entered on the sample reporting forms. The sample reporting forms are included in Appendix A.

5.1.2 COC and Sample Receipt Documentation

The samples were shipped to SVL under COC. The laboratory sample custodian noted that all samples were received intact. The cooler temperature upon arrival at SVL was 11°C, outside the recommended range of 4°C±2°C. Based on the stability of the parameters of interest, data qualification was not considered necessary.

5.1.3 Holding Times

The samples were prepared and analyzed within the required holding time limits. Therefore, data qualification was not considered necessary.

5.1.4 Preparation Blanks and Calibration Blanks

Preparation Blanks

Several target analytes were detected in the preparation blanks for the metals analysis. The table below lists the analytes detected in the preparation blanks and any qualification issued.

Analyte	Concentration (µg/l)	Data Qualification
Antimony	2.732	The antimony results for samples WWC-H180, LWWC-1, and WWC-H180 (DIS), and LWWC-1 (DIS) were qualified as nondetect (U) at the reported concentrations.
Calcium	9.354	None. The results were reported at concentrations greater than five times the amount found in the preparation blank.
Copper	0.056	
Zinc	2.272	

Calibration Blanks

Several target analytes were detected in the CCBs for the metals analyses. The table below lists the analytes detected in the CCBs and any qualification issued.

Analyte	CCB1 (µg/l)*	CCB2 (µg/l)*	CCB3 (µg/l)*	Data Qualification
Antimony		4.488	5.646	All detected antimony results were qualified as nondetect (U) at the reported concentrations.
Aluminum		-13.174		None. Either the blank result was negative and the blank concentration does not account for more than 25% of the associated reported results or the sample results were reported at concentrations greater than five times positive amounts found in the CCBs
Cadmium			0.038	
Calcium		9.014	9.877	
Iron			-17.703	
Magnesium			-20.880	
Selenium		0.065	0.077	

* Results in µg/l. An empty cell indicates that the analyte was not detected with an absolute value > IDL.

5.1.5 Duplicate Sample Analysis

Additional aliquots of sample GRUNERUD-1 AND GRUNERUD-1 (DIS) were used to prepare the method duplicate sample. The concentration-dependent evaluation

criteria listed in Table 3-1 were met for all analytes. Therefore, data qualification was not necessary.

5.1.6 Matrix Spike Analysis

Additional aliquots of sample GRUNERUD-1 AND GRUNERUD-1 (DIS) were used to prepare the matrix spike sample. With the exceptions listed in the table below, recoveries for all analytes were within the acceptance range of 75-125%. The matrix spike recoveries for aluminum, calcium, magnesium, manganese, and zinc were not considered appropriate for assessing accuracy because the sample results were greater than four times the spike amount.

Analyte	MS %R	Data Qualification
GRUNDERUD-1 (DIS)		
Dissolved Barium	3.3	All dissolved barium results in this package were reported as detectable and were qualified as estimated (J) to reflect the potential low bias of nearly 2 orders of magnitude.
Dissolved Silver	53.3	The dissolved silver results reported in this package were qualified as estimated (J/UJ) to reflect the potential low bias.

Post-digestion spike analysis were conducted for ICP analysis to aid in determining whether the matrix spike results that were out of acceptance limits were caused by the sample matrix, a bias in the analytical system, or a combination of both. Recovery for the barium post-digestion spikes was within the acceptance range of 75-125%.

5.1.7 Serial Dilutions

A serial dilution is not required by Methods 200.7 and 200.8.

5.2 SVL Data Package 125480

Data package 125480 contained the analytical results for six total recoverable and dissolved samples. The table below lists the laboratory IDs, corresponding field IDs, and QC designations.

Laboratory ID	Field ID	QC Designation
W537757	HC-51.6	MS/MD/PDS
W537758	WWC-38.1	
W537759	BC-1	
W537760	BFT-1	

Laboratory ID	Field ID	QC Designation
W537761	WWC-29.7	
W537762	WWC-28.6	
W537763 (DIS)	HC-51.6 (DIS)	MS/MD/PDS
W537764 (DIS)	WWC-38.1 (DIS)	
W537765 (DIS)	BC-1 (DIS)	
W537766 (DIS)	BFT-1 (DIS)	
W537767 (DIS)	WWC-29.7 (DIS)	
W537769 (DIS)	WWC-28.6 (DIS)	

MSD – Matrix Spike Duplicate
SD – Serial Dilution
MS – Matrix Spike
FD – Field Duplicate
PDS – Post-Digestion Spike

5.2.1 Overall Assessment

The data are considered usable for meeting project objectives with the qualifications noted in the following narrative. The data qualifiers and associated qualifier and bias codes were hand-entered on the sample reporting forms. The sample reporting forms are included in Appendix A.

5.2.2 COC and Sample Receipt Documentation

The samples were shipped to SVL under chain-of-custody (COC). The laboratory sample custodian noted that all samples were received intact. Cooler temperature upon arrival at SVL was 4.7°C, within the recommended range of 4°C±2°C. Therefore, data qualification was not necessary.

5.2.3 Holding Times

The samples were prepared and analyzed within the required holding time limits. Therefore, data qualification was not considered necessary.

5.2.4 Preparation Blanks and Calibration Blanks

Preparation Blanks

Several target analytes were detected in the preparation blanks. The table below lists the analytes detected in the preparation blanks and any qualification issued.

Analyte	PB (µg/l)	Data Qualification
Copper	-0.065	None. Either the blank result was negative and the blank concentration does not account for more than 25% of the associated reported results or the sample results were reported at concentrations greater than five times positive amounts found in the CCBs
Iron	3.888	
Zinc	1.410	The detectable zinc results for samples BFT-1 and BFT-1(DIS) were qualified as nondetect (U) at the reported concentrations.
Nickel	2.053	The nickel results for samples HC-51.6, WWC-29.7, WWC-29.7 (DIS) were qualified as nondetect (U) at the reported concentrations.

Calibration Blanks

Several targets analytes were detected in various CCBs for the metals analysis. The table below lists the analytes detected in the CCBs associated with the samples reported in this SDG and any qualification issued.

Analyte	CCB1 (µg/l)*	CCB2 (µg/l)*	CCB3 (µg/l)*	Data Qualification
Aluminum			-8.150	None. Either the blank result was negative and the blank concentration does not account for more than 25% of the associated reported results or the sample results were reported at concentrations greater than five times positive amounts found in the CCBs.
Thallium	0.034	0.028	0.025	
Zinc		0.490		
Cadmium		0.067		The detectable cadmium result for sample BFT-1 was qualified as nondetect (U) at the reported concentration.
Boron			9.072	The detectable boron result for sample BC-1 (DIS) was qualified as nondetect (U) at the reported concentration.
Cadmium	-0.035			The cadmium result for sample BFT-1 (DIS) was qualified as estimated (UJ) to reflect the potential low bias.

* An empty cell indicates that the analyte was not detected with an absolute value > IDL.

5.2.5 Duplicate Sample Analysis

Additional aliquots of sample HC-51.6 and HC-51.6 (DIS) were used to prepare the method duplicate samples. With one exception, the concentration-dependent evaluation criteria listed in Table 3-1 were met for all analytes. The RPD between the sample result and the duplicate result for total copper for sample HC-51.6 exceeded the evaluation criterion of ≤20% with a RPD of 85%. Therefore, all total copper results were qualified as estimated (J/UJ).

5.2.6 Matrix Spike Analysis

Additional aliquots of sample HC-51.6 and HC-51.6 (DIS) were used to prepare the matrix spike samples. With the exceptions listed in the table below, recoveries for all analytes were within the acceptance range of 75-125% for the total and dissolved analyses. The matrix spike recovery for aluminum and iron were not considered appropriate for assessing accuracy because the sample results were greater than four times the spike amount.

Analyte	MS %R	Data Qualification
HC-51.6		
Zinc	139.1	The total detectable zinc results reported in this package were qualified as estimated (J) to reflect the potential high bias.
HC-51.6 (DIS)		
Barium	10.4	The dissolved detectable barium results reported in this package were qualified as estimated (J) to reflect the potential low bias.
Silver	68.8	The dissolved silver results reported in this package were qualified as estimated (J/UJ) to reflect the potential low bias.

Post-digestion spike analyses are conducted for ICP analysis to aid in determining whether the matrix spike results that were out of acceptance limits were caused by the sample matrix, a bias in the analytical system, or a combination of both. Recoveries for the total zinc and dissolved barium post-digestion spike recoveries were within the acceptance range of 75-125%.

5.2.7 Serial Dilutions

A serial dilution is not required by Methods 200.7 and 200.8.

6. FIELD QUALITY PARAMETERS

During the investigation no rinsate blanks were collected. Two field duplicate pairs were collected. The results obtained for these field quality control samples are discussed in the sections below.

6.1 Rinsate Blank Results

No rinsate blank samples were collected in association with this sampling event.

6.2 Field Duplicate Agreement

The total and dissolved field duplicate sample pairs collected during this sampling event are listed in the table below.

Field Duplicate Pair
GRUNERUD-1/GAI-1
GRUNERUD-1 (DIS)/GAI-1 (DIS)

All field duplicate results satisfied the applicable evaluation criterion in Table 3-1. This indicates an acceptable level of overall sampling and analysis precision.

7. OVERALL ASSESSMENT

The sample data are considered to be acceptable for use in reconciliation with project objectives as qualified.

A general overall assessment of each of the QAP's data quality assurance objectives is provided below.

7.1 Reporting Limits

Reporting limits (RLs) are established by the analytical laboratory based on the IDLs, historical data, and comparison to EPA limits for the respective methods. Table 7- 1 presents RLs obtained versus the required RLs for the surface waters. All reporting limits satisfied the reporting limit requirements

TABLE 7-1
REPORTING LIMIT COMPARISON

Analyte	Reporting Limit Requirements (µg/l)	SVL IDL (µg/l)
Aluminum	30	6.9
Antimony	20	5.5
Arsenic	25	4.5
Barium	2	0.3
Boron	40	8.4
Cadmium	.042/.105[4]	0.02
Chromium	6	0.7
Cobalt	6	0.2
Copper	.2/.5	0.03
Iron	60	1.5
Lead	.220/.550[4]	0.05
Manganese	4	0.8
Mercury	0.2	0.1
Molybdenum	8	1.4
Nickel (Ni)	10	1.9
Selenium	0.625	0.05

Analyte	Reporting Limit Requirements (µg/l)	SVL IDL (µg/l)
Silver	.03/.075[4]	0.008
Thallium	.1/.25[4]	0.02
Vanadium	5	0.7
Zinc	10	0.4
Total Dissolved Solids	10	10
Total Suspended Solids	5	5

IDL – Instrument Detection Limit (µg/l)– micrograms per liter

[4] Only dissolved standard applies

7.2 Accuracy

Accuracy is defined as the degree of agreement of a measurement to an accepted reference or true value. Accuracy was measured as the percent recovery (%R) of an analyte in a reference standard or spiked sample.

All laboratory control samples and all calibration standards and were within acceptance limits demonstrating acceptable overall accuracy of the analytical system.

Approximately 93% of the surface water matrix spike recoveries were within acceptance limits indicating that the overall level of accuracy attained with respect to the site-specific sample matrix is considered to be acceptable.

The dissolved barium matrix spike recoveries were extremely low with recoveries of 3.3% and 10.4%. The dissolved barium parent sample result and the dissolved field duplicate result as well as the total recoverable results for the parent sample and the field duplicate sample were extremely similar in concentrations indicating that the low recovery is not related to sample heterogeneity. The barium PDS recoveries for the dissolved samples were within the acceptance limits which means that the cause of the low recoveries is not matrix interference to the analysis. The total recoverable barium MS recoveries were both within the acceptance limits. Since everything that is present

in the dissolved samples is also present in the total recoverable samples, a matrix effect to digestion in only the filtered samples is not likely. This implies that either there is a laboratory problem such as not having the right barium spike level or there is something the reviewer has not found in the data package to explain the low recoveries, such as a sporadic loss of sensitivity in the barium analysis that happened to manifest itself only in the two matrix spike samples for dissolved barium.. Evidence in the data package that it's not a spiking error is the observation that the same spiking solution was used for both the dissolved and total recoverable samples as well as the LCS samples and the low recoveries were limited to barium in the dissolved samples. A calculation error is not likely since the concentrations reported in the instrument printouts in the raw data agree with the reported results. Entry of a wrong sample size or dilution is not likely since the recoveries of the metals other than barium are all within limits. It is not clear from evidence available to the validator whether the low bias is a real matrix effect or an artifact of something that happened in the laboratory that is not discernible from the data package. Regardless of the cause, the low recoveries indicate that there may be problem with the dissolved barium analyses resulting in sporadic low biases. As such, all dissolved barium results are considered estimated with a potential low bias.

7.3 Precision

Precision is defined as the agreement between a set of replicate measurements without assumption or knowledge of the true value. Precision of laboratory measurements was evaluated by the comparison of sample/sample duplicate results.

With one exception, all of the laboratory duplicate results satisfied the applicable evaluation criteria. Therefore, the overall level of precision demonstrated by the analyses is considered to be acceptable

Precision of field sampling and laboratory analysis was evaluated by the comparison of field duplicate sample results. The agreement shown by the field duplicate results (100% met precision criteria) is indicative of an acceptable level of overall sampling and analysis precision.

7.4 Completeness

All of the results are considered usable as qualified. As such, the analytical completeness for the supplemental sampling, defined as the ratio of the number of

valid analytical results (valid analytical results include estimated values) to the total number of analytical results requested on samples submitted for analysis, is greater than 100% which satisfies the QAP requirement of 80%. All valid results are considered acceptable for use in meeting project objectives.

7.5 Representativeness

Representativeness is the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness was maintained during sampling efforts by completing sampling in compliance with the FSP, and relevant SOPs.

Consistent, uniform sample collection protocols, including such tasks as storage, preservation and transportation, were used to assure that the representativeness of the samples gathered during the AOC met project objectives. Proper documentation in the field and laboratory verified that protocols were followed and that sample identification as well as integrity was preserved.

7.6 Comparability

Comparability expresses the confidence with which one data set can be compared to another. Comparability can be related to accuracy and precision because these quantities are measures of data reliability. Data are comparable if collection techniques, measurement procedures, method, and reporting limits are equivalent for the samples within a sample set. As the samples in this set were analyzed in accordance with the quality assurance and quality control measures prescribed in the QAP, and acceptable levels of overall accuracy and precision were attained, the data within this set are considered to be comparable to each other.

APPENDIX A.

DATA REPORTING FORMS

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

4

Certificate: ID ID00019

CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: HC-51.6
Sample Collected: 9/20/06 10:05
Sample Receipt : 9/22/06
Date of Report : 10/18/06

SVL JOB: 125480
SAMPLE: 537757
TOT/DIS
Matrix: WATERS

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	2170	mg/L		160.1	9/27/06
T	TSS	8	mg/L		160.2	9/27/06

Filtered fraction: 537763

Reviewed By: Kirby Gray Date 10/18/2006
10/18/06 14:55

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/28/06

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

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Certificate: ID ID00019

CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: WWC-38.1
Sample Collected: 9/20/06 11:00
Sample Receipt : 9/22/06
Date of Report : 10/18/06

SVL JOB: 125480
SAMPLE: 537758
TOT/DIS
Matrix: WATERS

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	2240	mg/L		160.1	9/27/06
T	TSS	<5	mg/L		160.2	9/27/06

Filtered fraction: 537764

Reviewed By: Kirby Gray Date 10/18/2006
10/18/06 14:55

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/28/06
080

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

6
Certificate: ID ID00019

CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: BC-1
Sample Collected: 9/20/06 11:55
Sample Receipt : 9/22/06
Date of Report : 10/18/06

SVL JOB: 125480
SAMPLE: 537759
TOT/DIS
Matrix: WATERS

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	282	mg/L		160.1	9/27/06
T	TSS	<5	mg/L		160.2	9/27/06

Filtered fraction: 537765

Reviewed By: Kirby Gray Date 10/18/2006
10/18/06 14:55

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/20/06
DBO

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: BFT-1
Sample Collected: 9/20/06 12:50
Sample Receipt : 9/22/06
Date of Report : 10/18/06

SVL JOB: 125480
SAMPLE: 537760
TOT/DIS
Matrix: WATERS

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	<10	mg/L		160.1	9/27/06
T	TSS	<5	mg/L		160.2	9/27/06

Filtered fraction: 537766

Reviewed By: Kirby Gray Date 10/18/2006
10/18/06 14:55

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

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SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: WWC-29.7
Sample Collected: 9/20/06 14:15
Sample Receipt : 9/22/06
Date of Report : 10/18/06

SVL JOB: 125480
SAMPLE: 537761
TOT/DIS
Matrix: WATERS

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	763	mg/L		160.1	9/27/06
T	TSS	<5	mg/L		160.2	9/27/06

Filtered fraction: 537767

Reviewed By: Vicky Gray Date 10/18/2006
10/18/06 14:55

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/28/06 DLO

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

9
Certificate: ID ID00019

CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: WWC-28.6
Sample Collected: 9/20/06 15:00
Sample Receipt : 9/22/06
Date of Report : 10/18/06

SVL JOB: 125480
SAMPLE: 537762
TOT/DIS
Matrix: WATERS

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	1950	mg/L		160.1	9/27/06
T	TSS	1080	mg/L		160.2	9/27/06

Filtered fraction: 537768

Reviewed By: Kirby Gray Date 10/18/2006
10/18/06 14:55

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/28/06 JRO

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U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE NO.

W537757

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480_____
Matrix (soil/water): WATER Lab Sample ID: W537757
Level (low/med): LOW Date Received: 09/22/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	299			P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	77.4			P	
7440-43-9	Cadmium	4.8	B		PM	
7440-47-3	Chromium	1.3	B		P	
7440-48-4	Cobalt	0.75	B		P	
7440-50-8	Copper	39.7			PM	J LD-I
7439-89-6	Iron	360			P	
7439-92-1	Lead	2.6	B		PM	
7439-96-5	Manganese	300			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	2.4	B		P	u MB-H
7782-49-2	Selenium	2.3	B		PM	
7440-22-4	Silver	0.02	U		PM	
7440-28-0	Thallium	0.05	U		PM	
7440-62-2	Vanadium	1.7	B		P	
7440-66-6	Zinc	1550		N	P	J MS-H
7440-74-8	Boron	8.4	U		P	
7439-98-7	Molybdenum	35.7			P	
	Hardness	1450000			P	

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:
CLIENT_ID: HC-51.6
HARDNESS_BY_CALCULATION

12/28/06
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U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE NO.

W537758

Lab Name: SVL ANALYTICAL INC. Contract:
Lab Code: SILVER Case No: SAS No: SDG No: 125480
Matrix (soil/water): WATER Lab Sample ID: W537758
Level (low/med): LOW Date Received: 09/22/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	537			P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	57.8			P	
7440-43-9	Cadmium	9.8			PM	
7440-47-3	Chromium	1.7	B		P	
7440-48-4	Cobalt	9.4			P	
7440-50-8	Copper	279			PM	J LD-I
7439-89-6	Iron	18.4	B		P	
7439-92-1	Lead	1.4	B		PM	
7439-96-5	Manganese	1230			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	15.3			P	
7782-49-2	Selenium	2.2	B		PM	
7440-22-4	Silver	0.02	U		PM	
7440-28-0	Thallium	0.05	U		PM	
7440-62-2	Vanadium	0.70	U		P	
7440-66-6	Zinc	1810		N	P	J ~~MS~~ MS-H
7440-74-8	Boron	8.4	U		P	
7439-98-7	Molybdenum	10.1			P	
	Hardness	1600000			P	

Color Before: COLORLESS Clarity Before: CLEAR Texture:
Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:
CLIENT_ID: WWC-38.1
HARDNESS_BY_CALCULATION

12/28/06
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U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE NO.

W537759

Lab Name: SVL ANALYTICAL INC. Contract:
Lab Code: SILVER Case No: SAS No: SDG No: 125480
Matrix (soil/water): WATER Lab Sample ID: W537759
Level (low/med): LOW Date Received: 09/22/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	17.7	B		P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	58.9			P	
7440-43-9	Cadmium	0.82	B		PM	
7440-47-3	Chromium	0.84	B		P	
7440-48-4	Cobalt	0.20	U		P	
7440-50-8	Copper	32.5			PM	J LD=I
7439-89-6	Iron	76.6			P	
7439-92-1	Lead	2.4	B		PM	
7439-96-5	Manganese	57.4			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	1.9	U		P	
7782-49-2	Selenium	1.1	B		PM	
7440-22-4	Silver	0.04	B		PM	
7440-28-0	Thallium	0.05	U		PM	
7440-62-2	Vanadium	1.9	B		P	
7440-66-6	Zinc	109		N	P	J MS-H
7440-74-8	Boron	20.4	B		P	
7439-98-7	Molybdenum	7.3	B		P	
	Hardness	169000			P	

Color Before: COLORLESS Clarity Before: CLEAR Texture:
Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:
CLIENT_ID: BC-1
HARDNESS_BY_CALCULATION

12/28/06 JRD

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U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE NO.
W537760

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480
Matrix (soil/water): WATER Lab Sample ID: W537760
Level (low/med): LOW Date Received: 09/22/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	148			P
7440-36-0	Antimony	5.5	U		P
7440-38-2	Arsenic	4.5	U		P
7440-39-3	Barium	27.2			P
7440-43-9	Cadmium	0.07	B		PM
7440-47-3	Chromium	0.70	U		P
7440-48-4	Cobalt	0.20	U		P
7440-50-8	Copper	20.0			PM I LD-F
7439-89-6	Iron	97.6			P
7439-92-1	Lead	0.27	B		PM
7439-96-5	Manganese	3.9	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	1.9	U		P
7782-49-2	Selenium	0.64	B		PM
7440-22-4	Silver	0.02	U		PM
7440-28-0	Thallium	0.05	U		PM
7440-62-2	Vanadium	0.70	U		P
7440-66-6	Zinc	3.5	B	N	P u MB-H
7440-74-8	Boron	8.4	U		P
7439-98-7	Molybdenum	1.8	B		P
	Hardness	22900			P

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:
CLIENT_ID: BFT-1
HARDNESS_BY_CALCULATION

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U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE NO.

W537761

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480
Matrix (soil/water): WATER Lab Sample ID: W537761
Level (low/med): LOW Date Received: 09/22/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	79.4			P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	58.8			P	
7440-43-9	Cadmium	1.6	B		PM	
7440-47-3	Chromium	0.70	U		P	
7440-48-4	Cobalt	1.3	B		P	
7440-50-8	Copper	32.6			PM	I LD-I
7439-89-6	Iron	25.3	B		P	
7439-92-1	Lead	0.82	B		PM	
7439-96-5	Manganese	312			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	3.8	B		P	u MB-H
7782-49-2	Selenium	1.7	B		PM	
7440-22-4	Silver	0.02	U		PM	
7440-28-0	Thallium	0.05	U		PM	
7440-62-2	Vanadium	0.72	B		P	
7440-66-6	Zinc	218		N	P	I MS-H
7440-74-8	Boron	8.4	U		P	
7439-98-7	Molybdenum	8.9			P	
	Hardness	515000			P	

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:
CLIENT_ID: WWC-29.7
HARDNESS_BY_CALCULATION

12/28/06 DLO

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE NO.

W537762

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480
Matrix (soil/water): WATER Lab Sample ID: W537762
Level (low/med): LOW Date Received: 09/22/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	39000			P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	310			P	
7440-43-9	Cadmium	11.0			PM	
7440-47-3	Chromium	17.4			P	
7440-48-4	Cobalt	48.0			P	
7440-50-8	Copper	650			PM	J LD-I
7439-89-6	Iron	30800			P	
7439-92-1	Lead	75.5			PM	
7439-96-5	Manganese	3120			P	
7439-97-6	Mercury	0.18	B		CV	
7440-02-0	Nickel	40.1			P	
7782-49-2	Selenium	2.5	B		PM	
7440-22-4	Silver	0.31			PM	
7440-28-0	Thallium	0.22	B		PM	
7440-62-2	Vanadium	43.7			P	
7440-66-6	Zinc	2040		N	P	J MS-H
7440-74-8	Boron	8.4	U		P	
7439-98-7	Molybdenum	6.5	B		P	
	Hardness	1460000			P	

Color Before: BROWN Clarity Before: CLOUDY Texture: _____
Color After: BROWN Clarity After: CLOUDY Artifacts: _____

Comments:
CLIENT_ID: WWC-28.6
HARDNESS_BY_CALCULATION

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1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W537763(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480_____
Matrix (soil/water): WATER Lab Sample ID: W537763
Level (low/med): LOW__ Date Received: 09/22/06
% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	6.9	U		P	
7440-36-0	Antimony	5.6	B		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	78.7		N	P	J MS-L
7440-43-9	Cadmium	4.3	B		PM	
7440-47-3	Chromium	0.70	U		P	
7440-48-4	Cobalt	0.66	B		P	
7440-50-8	Copper	12.2	B		PM	
7439-89-6	Iron	1.5	U		P	
7439-92-1	Lead	0.14	B		PM	
7439-96-5	Manganese	222			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	1.9	U		P	
7782-49-2	Selenium	2.4	B		PM	
7440-22-4	Silver	0.04	U	N	PM	UJ MS-L
7440-28-0	Thallium	0.02	U		PM	
7440-62-2	Vanadium	0.78	B		P	
7440-66-6	Zinc	1380			P	
7440-74-8	Boron	8.4	U		P	
7439-98-7	Molybdenum	38.6			P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_HC-51.6_(DISSOLVED_METALS)_____

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1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W537764(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480
Matrix (soil/water): WATER Lab Sample ID: W537764
Level (low/med): LOW__ Date Received: 09/22/06
% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	156			P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	58.5		N	P	J ms-L
7440-43-9	Cadmium	9.5	B		PM	
7440-47-3	Chromium	0.70	U		P	
7440-48-4	Cobalt	9.9			P	
7440-50-8	Copper	209			PM	
7439-89-6	Iron	1.5	U		P	
7439-92-1	Lead	0.61	B		PM	
7439-96-5	Manganese	1200			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	14.4			P	
7782-49-2	Selenium	2.1	B		PM	
7440-22-4	Silver	0.04	U	N	PM	UJ ms-L
7440-28-0	Thallium	0.04	U		PM	
7440-62-2	Vanadium	0.70	U		P	
7440-66-6	Zinc	1720			P	
7440-74-8	Boron	8.4	U		P	
7439-98-7	Molybdenum	9.8			P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_WWC-38.1_(DISSOLVED_METALS)_____

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1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W537765(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480_____
Matrix (soil/water): WATER Lab Sample ID: W537765
Level (low/med): LOW__ Date Received: 09/22/06
% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	10.0	B		P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	58.0		N	P	J MS-L
7440-43-9	Cadmium	0.54	B		PM	
7440-47-3	Chromium	0.70	U		P	
7440-48-4	Cobalt	0.20	U		P	
7440-50-8	Copper	30.3	B		PM	
7439-89-6	Iron	44.8	B		P	
7439-92-1	Lead	1.4	B		PM	
7439-96-5	Manganese	56.7			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	1.9	U		P	
7782-49-2	Selenium	1.1	B		PM	
7440-22-4	Silver	0.04	U	N	PM	UJ MS-L
7440-28-0	Thallium	0.02	U		PM	
7440-62-2	Vanadium	1.9	B		P	
7440-66-6	Zinc	103			P	
7440-74-8	Boron	20.2	B		P	U MB-H
7439-98-7	Molybdenum	7.5	B		P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_BC-1_(DISSOLVED_METALS)_____

12/28/06 DLO

U.S. EPA - CLP

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1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W537766(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480
Matrix (soil/water): WATER Lab Sample ID: W537766
Level (low/med): LOW Date Received: 09/22/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	62.7			P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	26.8		N	P	J MS-L
7440-43-9	Cadmium	0.10	U		PM	UJ CCB-L
7440-47-3	Chromium	0.70	U		P	
7440-48-4	Cobalt	0.20	U		P	
7440-50-8	Copper	21.0	B		PM	
7439-89-6	Iron	46.5	B		P	
7439-92-1	Lead	0.17	B		PM	
7439-96-5	Manganese	4.1			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	1.9	U		P	
7782-49-2	Selenium	0.57	B		PM	
7440-22-4	Silver	0.04	U	N	PM	UJ MS-L
7440-28-0	Thallium	0.02	U		PM	
7440-62-2	Vanadium	0.70	U		P	
7440-66-6	Zinc	1.9	B		P	U MB-H
7440-74-8	Boron	8.4	U		P	
7439-98-7	Molybdenum	1.4	U		P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_BFT-1_(DISSOLVED_METALS)

12/28/06

U.S. EPA - CLP

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1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W537767(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480
Matrix (soil/water): WATER Lab Sample ID: W537767
Level (low/med): LOW Date Received: 09/22/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	32.1			P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	57.2		N	P	J MS-L
7440-43-9	Cadmium	1.3	B		PM	
7440-47-3	Chromium	0.70	U		P	
7440-48-4	Cobalt	2.2	B		P	
7440-50-8	Copper	30.5	B		PM	
7439-89-6	Iron	7.0	B		P	
7439-92-1	Lead	0.30	B		PM	
7439-96-5	Manganese	309			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	4.4	B		P	U MB-H
7782-49-2	Selenium	2.4	B		PM	
7440-22-4	Silver	0.04	U	N	PM	UJ MS-L
7440-28-0	Thallium	0.02	U		PM	
7440-62-2	Vanadium	0.72	B		P	
7440-66-6	Zinc	210			P	
7440-74-8	Boron	8.4	U		P	
7439-98-7	Molybdenum	7.5	B		P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_WWC-29.7_(DISSOLVED_METALS)

12/28/06 AKO

U.S. EPA - CLP

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1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W537768(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: 125480
Matrix (soil/water): WATER Lab Sample ID: W537768
Level (low/med): LOW Date Received: 09/22/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	153			P	
7440-36-0	Antimony	5.5	U		P	
7440-38-2	Arsenic	4.5	U		P	
7440-39-3	Barium	56.4		N	P	J MS-L
7440-43-9	Cadmium	9.0	B		PM	
7440-47-3	Chromium	0.70	U		P	
7440-48-4	Cobalt	26.1			P	
7440-50-8	Copper	144			PM	
7439-89-6	Iron	5.2	B		P	
7439-92-1	Lead	0.44	B		PM	
7439-96-5	Manganese	2130			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	26.5			P	
7782-49-2	Selenium	1.4	B		PM	
7440-22-4	Silver	0.04	U	N	PM	UJ MS-L
7440-28-0	Thallium	0.02	U		PM	
7440-62-2	Vanadium	0.70	U		P	
7440-66-6	Zinc	1670			P	
7440-74-8	Boron	8.4	U		P	
7439-98-7	Molybdenum	3.4	B		P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_WWC-28.6_(DISSOLVED_METALS)_____

12/28/06 JW

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

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Certificate: ID ID00019

CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: GRUNERUD-1
Sample Collected: 9/21/06 13:00
Sample Receipt : 9/26/06
Date of Report : 10/18/06

SVL JOB: 125528
SAMPLE: 538268
TOT/DIS

Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	2860	mg/L		160.1	9/28/06
T	TSS	14	mg/L		160.2	9/28/06

Filtered fraction: 538273

Reviewed By: Kirby Gray Date 10/19/2006
10/18/06 15:51

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/28/06

VL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

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CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: B-RANCH
Sample Collected: 9/21/06 15:15
Sample Receipt : 9/26/06
Date of Report : 10/18/06

SVL JOB: 125528
SAMPLE: 538269
TOT/DIS
Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	3000	mg/L		160.1	9/28/06
T	TSS	<5	mg/L		160.2	9/28/06

Filtered fraction: 538274

Reviewed By: Kirby Gray Date 10/19/2006
10/18/06 15:51

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/28/06 OK

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SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: GAI-1
Sample Collected:
Sample Receipt : 9/26/06
Date of Report : 10/18/06

SVL JOB: 125528
SAMPLE: 538270
TOT/DIS
Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	2840	mg/L		160.1	9/28/06
T	TSS	18	mg/L		160.2	9/28/06

Filtered fraction: 538275

Reviewed By: Kristy Gray Date 10/19/2006
10/18/06 15:51

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/28/06 JRO

SVL ANALYTICAL, INC.
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Certificate: ID ID00019

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CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: WWC-H180
Sample Collected: 9/21/06 16:15
Sample Receipt : 9/26/06
Date of Report : 10/18/06

SVL JOB: 125528
SAMPLE: 538271
TOT/DIS
Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	1190	mg/L		160.1	9/28/06
T	TSS	8	mg/L		160.2	9/28/06

Filtered fraction: 538276

Reviewed By: Kirby Gray Date 10/19/2006
10/18/06 15:51

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/28/06
DLO

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SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891
Certificate: ID ID00019

CLIENT : PHELPS DODGE - CHINO MINES
PROJECT: G04880
CLIENT SAMPLE ID: LWWC-1
Sample Collected: 9/22/06 9:00
Sample Receipt : 9/26/06
Date of Report : 10/18/06

SVL JOB: 125528
SAMPLE: 538272
TOT/DIS
Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	TDS	589	mg/L		160.1	9/28/06
T	TSS	6	mg/L		160.2	9/28/06

Filtered fraction: 538277

Reviewed By: Kristy Gray Date 10/19/2006
10/18/06 15:51

AZ: AZ0538 CA: CERTIFICATE NO. 2080 CO: CERTIFICATE 08/31/07 ID: ID00019 MT: 6/6/05 NV: 8/1/05 WA: C1268

12/28/06
DLW

U.S. EPA - CLP

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1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W538268

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: W538268
Matrix (soil/water): WATER Lab Sample ID: W538268
Level (low/med): LOW Date Received: 09/26/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	14200			P
7440-36-0	Antimony	14.5	B		P
7440-38-2	Arsenic	5.1	U		P
7440-39-3	Barium	72.7			P
7440-43-9	Cadmium	27.8			PM
7440-70-2	Calcium ✓	573000			P
7440-47-3	Chromium	0.40	U		P
7440-48-4	Cobalt	176			P
7440-50-8	Copper	1350			PM
7439-89-6	Iron	20.6	B		P
7439-92-1	Lead	5.6	B		PM
7439-95-4	Magnesium ✓	94500			P
7439-96-5	Manganese	10400			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	138			P
7782-49-2	Selenium	3.0	B		PM
7440-22-4	Silver	0.08	B		PM
7440-28-0	Thallium	0.05	U		PM
7440-62-2	Vanadium	0.59	B		P
7440-66-6	Zinc	5540			P
7440-74-8	Boron	142			P
7439-98-7	Molybdenum	5.1	B		P
	Hardness	1820000			P

UJ - ICSA & CCB-I

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:
CLIENT_ID: GRUNERUD-1
HARDNESS_BY_CALCULATION

FORM I - IN

12/28/06 JRC

U.S. EPA - CLP

10

1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W538269

Lab Name: SVL ANALYTICAL INC. Contract:

Lab Code: SILVER Case No: SAS No: SDG No: W538268

Matrix (soil/water): WATER Lab Sample ID: W538269

Level (low/med): LOW Date Received: 09/26/06

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	28900			P
7440-36-0	Antimony	14.4	B		P
7440-38-2	Arsenic	5.1	U		P
7440-39-3	Barium	53.4			P
7440-43-9	Cadmium	34.3			PM
7440-70-2	Calcium	541000			P
7440-47-3	Chromium	0.40	U		P
7440-48-4	Cobalt	366			P
7440-50-8	Copper	2430			PM
7439-89-6	Iron	24.5	B		P
7439-92-1	Lead	8.2			PM
7439-95-4	Magnesium	101000			P
7439-96-5	Manganese	16200			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	219			P
7782-49-2	Selenium	4.1	B		PM
7440-22-4	Silver	0.11	B		PM
7440-28-0	Thallium	0.05	U		PM
7440-62-2	Vanadium	0.48	B		P
7440-66-6	Zinc	7880			P
7440-74-8	Boron	144			P
7439-98-7	Molybdenum	4.9	B		P
	Hardness	1770000			P

J ICSA; ICB-I

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

CLIENT_ID: B-RANCH

HARDNESS_BY_CALCULATION

12/28/06 JKO

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE NO.

W538270

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: W538268
Matrix (soil/water): WATER Lab Sample ID: W538270
Level (low/med): LOW Date Received: 09/26/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15100			P
7440-36-0	Antimony	15.0	B		P
7440-38-2	Arsenic	5.1	U		P
7440-39-3	Barium	75.1			P
7440-43-9	Cadmium	27.5			PM
7440-70-2	Calcium	557000			P
7440-47-3	Chromium	0.40	U		P
7440-48-4	Cobalt	181			P
7440-50-8	Copper	1260			PM
7439-89-6	Iron	15.2	B		P
7439-92-1	Lead	5.7	B		PM
7439-95-4	Magnesium	94100			P
7439-96-5	Manganese	10400			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	142			P
7782-49-2	Selenium	3.3	B		PM
7440-22-4	Silver	0.06	B		PM
7440-28-0	Thallium	0.05	U		PM
7440-62-2	Vanadium	0.40	U		P
7440-66-6	Zinc	5840			P
7440-74-8	Boron	151			P
7439-98-7	Molybdenum	6.7	B		P
	Hardness	1780000			P

J ICSA, CCB-I

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:
CLIENT_ID: GAI-1
HARDNESS_BY_CALCULATION

FORM I - IN

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U.S. EPA - CLP

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1
INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE NO.

W538271

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: W538268_____
Matrix (soil/water): WATER Lab Sample ID: W538271
Level (low/med): LOW__ Date Received: 09/26/06
% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1880			P
7440-36-0	Antimony	12.8	B		P
7440-38-2	Arsenic	5.1	U		P
7440-39-3	Barium	78.7			P
7440-43-9	Cadmium	10.7			PM
7440-70-2	Calcium	221000			P
7440-47-3	Chromium	0.43	B		P
7440-48-4	Cobalt	87.1			P
7440-50-8	Copper	537			PM
7439-89-6	Iron	14.0	U		P
7439-92-1	Lead	0.12	U		PM
7439-95-4	Magnesium	42200			P
7439-96-5	Manganese	6100			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	159			P
7782-49-2	Selenium	1.9	B		PM
7440-22-4	Silver	0.02	U		PM
7440-28-0	Thallium	0.05	U		PM
7440-62-2	Vanadium	0.84	B		P
7440-66-6	Zinc	1630			P
7440-74-8	Boron	59.0			P
7439-98-7	Molybdenum	5.2	B		P
	Hardness	725000			P

UJ MB ICS ICCB-I

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:
CLIENT_ID: WWC-H180
HARDNESS_BY_CALCULATION

FORM I - IN

12/28/06

U.S. EPA - CLP

13

1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W538272

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: W538268_____
Matrix (soil/water): WATER Lab Sample ID: W538272
Level (low/med): LOW__ Date Received: 09/26/06
% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1500			P
7440-36-0	Antimony	12.9	B		P
7440-38-2	Arsenic	5.1	U		P
7440-39-3	Barium	34.0			P
7440-43-9	Cadmium	5.2			PM
7440-70-2	Calcium	103000			P
7440-47-3	Chromium	0.40	U		P
7440-48-4	Cobalt	57.7			P
7440-50-8	Copper	557			PM
7439-89-6	Iron	14.0	U		P
7439-92-1	Lead	0.12	U		PM
7439-95-4	Magnesium	21600			P
7439-96-5	Manganese	2340			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	52.3			P
7782-49-2	Selenium	0.91	B		PM
7440-22-4	Silver	0.02	U		PM
7440-28-0	Thallium	0.05	U		PM
7440-62-2	Vanadium	0.68	B		P
7440-66-6	Zinc	872			P
7440-74-8	Boron	39.0	B		P
7439-98-7	Molybdenum	3.2	B		P
	Hardness	347000			P

u MB, ICS, ICB I

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:
CLIENT_ID: LWWC-1
HARDNESS_BY_CALCULATION

12/28/06
DKO

U.S. EPA - CLP

14

1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W538273(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: W538268_____
Matrix (soil/water): WATER Lab Sample ID: W538273
Level (low/med): LOW__ Date Received: 09/26/06
% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	14000			P	
7440-36-0	Antimony	16.0	B		P	WJ ICSA,ICCB-I
7440-38-2	Arsenic	5.1	U		P	
7440-39-3	Barium	75.5		N	P	J MS-L
7440-43-9	Cadmium	27.2			PM	
7440-70-2	Calcium	543000			P	
7440-47-3	Chromium	0.40	U		P	
7440-48-4	Cobalt	181			P	
7440-50-8	Copper	1220			PM	
7439-89-6	Iron	16.9	B		P	
7439-92-1	Lead	5.7	B		PM	
7439-95-4	Magnesium	92100			P	
7439-96-5	Manganese	10200			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	143			P	
7782-49-2	Selenium	5.5			PM	
7440-22-4	Silver	0.06	B	N	PM	J MS-L
7440-28-0	Thallium	0.04	U		PM	
7440-62-2	Vanadium	0.40	U		P	
7440-66-6	Zinc	5840			P	
7440-74-8	Boron	137			P	
7439-98-7	Molybdenum	5.7	B		P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_GRUNERUD-1_(DISSOLVED_METALS)_____

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U.S. EPA - CLP

15

1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W538274(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: W538268_____
Matrix (soil/water): WATER Lab Sample ID: W538274
Level (low/med): LOW__ Date Received: 09/26/06
% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	28800			P	
7440-36-0	Antimony	17.5	B		P	J ICSA, ICCB-I
7440-38-2	Arsenic	5.1	U		P	
7440-39-3	Barium	49.6		N	P	J MS-L
7440-43-9	Cadmium	34.2			PM	
7440-70-2	Calcium	501000			P	
7440-47-3	Chromium	0.42	B		P	
7440-48-4	Cobalt	334			P	
7440-50-8	Copper	2340			PM	
7439-89-6	Iron	15.4	B		P	
7439-92-1	Lead	8.0			PM	
7439-95-4	Magnesium	100000			P	
7439-96-5	Manganese	15900			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	204			P	
7782-49-2	Selenium	6.2			PM	
7440-22-4	Silver	0.09	B	N	PM	J MS-L
7440-28-0	Thallium	0.04	U		PM	
7440-62-2	Vanadium	0.68	B		P	
7440-66-6	Zinc	7890			P	
7440-74-8	Boron	150			P	
7439-98-7	Molybdenum	5.2	B		P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_B-RANCH_(DISSOLVED_METALS)_____

12/28/06
JK

U.S. EPA - CLP

16

1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W538275(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: W538268_____
Matrix (soil/water): WATER Lab Sample ID: W538275
Level (low/med): LOW__ Date Received: 09/26/06
% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	13700			P	
7440-36-0	Antimony	16.7	B		P	UJ ICSA, CCB-I
7440-38-2	Arsenic	5.1	U		P	
7440-39-3	Barium	73.6		N	P	J MS-L
7440-43-9	Cadmium	27.1			PM	
7440-70-2	Calcium	509000			P	
7440-47-3	Chromium	0.40	U		P	
7440-48-4	Cobalt	176			P	
7440-50-8	Copper	1230			PM	
7439-89-6	Iron	21.9	B		P	
7439-92-1	Lead	5.4	B		PM	
7439-95-4	Magnesium	93700			P	
7439-96-5	Manganese	10300			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	140			P	
7782-49-2	Selenium	5.5			PM	
7440-22-4	Silver	0.05	B	N	PM	J MS-L
7440-28-0	Thallium	0.04	U		PM	
7440-62-2	Vanadium	0.40	U		P	
7440-66-6	Zinc	5500			P	
7440-74-8	Boron	137			P	
7439-98-7	Molybdenum	7.2	B		P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_GAI-1_(DISSOLVED_METALS)_____

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U.S. EPA - CLP

17

1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W538276(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: W538268
Matrix (soil/water): WATER Lab Sample ID: W538276
Level (low/med): LOW Date Received: 09/26/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	476			P	
7440-36-0	Antimony	11.7	B		P	UJ MB, ICSA, ICCB-I
7440-38-2	Arsenic	5.1	U		P	
7440-39-3	Barium	72.9		N	P	J MS-L
7440-43-9	Cadmium	10.6			PM	
7440-70-2	Calcium	224000			P	
7440-47-3	Chromium	0.40	U		P	
7440-48-4	Cobalt	81.7			P	
7440-50-8	Copper	481			PM	
7439-89-6	Iron	14.0	U		P	
7439-92-1	Lead	0.13	B		PM	
7439-95-4	Magnesium	42200			P	
7439-96-5	Manganese	6120			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	150			P	
7782-49-2	Selenium	2.4	B		PM	
7440-22-4	Silver	0.02	U	N	PM	UJ MS-L
7440-28-0	Thallium	0.05	B		PM	
7440-62-2	Vanadium	0.94	B		P	
7440-66-6	Zinc	1600			P	
7440-74-8	Boron	56.9			P	
7439-98-7	Molybdenum	4.1	B		P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_WWC-H180_(DISSOLVED_METALS)_____

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U.S. EPA - CLP

18

1

CLIENT SAMPLE NO.

INORGANIC ANALYSES DATA SHEET

W538277(DIS

Lab Name: SVL_ANALYTICAL_INC._____ Contract: _____
Lab Code: SILVER Case No: _____ SAS No: _____ SDG No: W538268
Matrix (soil/water): WATER Lab Sample ID: W538277
Level (low/med): LOW Date Received: 09/26/06
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	726			P	
7440-36-0	Antimony	9.2	B		P	UJ MB;ICSA;I-CB-I
7440-38-2	Arsenic	5.1	U		P	
7440-39-3	Barium	35.7		N	P	
7440-43-9	Cadmium	5.2			PM	
7440-70-2	Calcium	101000			P	
7440-47-3	Chromium	0.40	U		P	
7440-48-4	Cobalt	60.9			P	
7440-50-8	Copper	554			PM	
7439-89-6	Iron	14.0	U		P	
7439-92-1	Lead	0.10	B		PM	
7439-95-4	Magnesium	21700			P	
7439-96-5	Manganese	2310			P	
7439-97-6	Mercury	0.10	U		CV	
7440-02-0	Nickel	54.7			P	
7782-49-2	Selenium	1.5	B		PM	
7440-22-4	Silver	0.02	U	N	PM	UJ MS-L
7440-28-0	Thallium	0.04	B		PM	
7440-62-2	Vanadium	0.40	U		P	
7440-66-6	Zinc	901			P	
7440-74-8	Boron	38.8	B		P	
7439-98-7	Molybdenum	3.1	B		P	
	Hardness				NR	

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____
Color After: _____ Clarity After: _____ Artifacts: _____

Comments:
CLIENT_ID:_LWWC-1(DISSOLVED_METALS)

12/28/06

APPENDIX C

DATA QUALITY ASSESSMENT REPORT
(URS WORK PRODUCT)

Final REPORT

DATA QUALITY ASSESSMENT REPORT FOR SURFACE WATER SAMPLING

Prepared for
Chino Mines Company
Hurley, New Mexico

January 15, 2007

URS

URS Corporation
8181 East Tufts Avenue
Denver, Colorado 80237

Project No. 22239000 Task 02201

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1. INTRODUCTION

This Data Quality Assessment Report (DQAR) is the written record of the reconciliation of the analytical data quality with the end use of the data and specific project objectives. The data were generated and reviewed in accordance with the approved Quality Assurance Plan (QAP) prepared by Chino Mines Company and Steffen, Robertson and Kirsten (U.S.), Inc. (March 1997).

All samples were sent to SVL Analytical (SVL) in Kellogg, Idaho and were analyzed in accordance with the Contract Laboratory Program (CLP) Statement of Work, ILM04.0 for the analytes requested on the Chain of Custody (COC) documentation.

Ten unfiltered (total) surface water samples and ten filtered (dissolved) surface water samples were collected. These samples are listed in below in Table 1-1. These data packages also included results for two field duplicate samples (one total recoverable metals sample and one dissolved sample). Results for these twenty-two samples were reported in two SVL data packages (125480 and 125528). These samples were also analyzed for TDS (total dissolved solids) and TSS (total suspended solids). The surface water sample results were compared to the Surface Water Standards presented in Table 2-1.

TABLE 1-1
SURFACE WATER SAMPLES COLLECTED

Field Sample Identification	QC Designation
GRUNERUD-1	MS/MD/PDS
B-RANCH	
GAI-1	FD to sample GRUNERUD-1
WWC-H180	
LWWC-1	
GRUNERUD-1 (DIS)	MS/MD/PDS
B-RANCH (DIS)	
GAI-1 (DIS)	FD to sample GRUNERUD-1 (DIS)
WWC-H180 (DIS)	
LWWC-1 (DIS)	
HC-51.6	MS/MD/PDS
WWC-38.1	
BC-1	
BFT-1	
WWC-29.7	
WWC-28.6	
HC-51.6 (DIS)	MS/MD/PDS
WWC-38.1 (DIS)	
BC-1 (DIS)	
BFT-1 (DIS)	
WWC-29.7 (DIS)	
WWC-28.6 (DIS)	

PDS = Post Digestion Spike
MD = Method Duplicate
QC = quality control
MS = Matrix Spike
FD = Filed Duplicate
DIS = Dissolved Sample (Filtered)

The data were generated and reviewed in accordance with the approved Administrative Order on Consent Quality Assurance Plan (QAP). The data were evaluated against the quantitative acceptance limits prescribed by the QAP for the data quality assurance parameters of reporting limits (RLs) (QAP-specified RLs were superseded by FSP required RLs), accuracy, precision, and completeness. The data were also evaluated for fulfillment of the qualitative data quality assurance parameters of representative and comparability as defined in the QAP.

The data validation results are presented in the Draft Data Validation Report for Surface Water Samples (URS, January 2007). The data validation report, on which this DQAR is based, contains a detailed narrative in which all results that did not satisfy the data quality assurance objectives in the QAP and the subsequent data qualification issued, if any, are described.

The DQAR is organized as follows and includes the required elements listed in Section 15 of the QAP. Section 2.0 provides a detailed discussion of the usability of the data relative to the intended end uses (project objectives). In order to facilitate this discussion, the project objectives and decision criteria are also summarized in this section. Section 3.0 provides recommendations for usability in potential additional data uses and limitations in data uses. Section 4.0 provides a brief summary of the results obtained for the data quality assurance objectives. Section 5.0 discusses corrective actions implemented and deviations from the Field Sampling Plan. Section 6.0 provides a summary of all instances where the data were considered inadequate for use in satisfying project objectives (DQOs) and the significance of the problems, if any. Conclusions are presented in Section 7.0.

2. DATA USABILITY RELATIVE TO PROJECT OBJECTIVES

The usability of the sample data relative to the intended end uses is discussed in this section.

The objective is to provide representative data from summer rainfall pools for comparison to surface water standards and use by the ecological risk assessor for NMED. The general data needs are the location and description of the pools and analytical data from samples. The analytical data needs are:

- Metals with designated use standards for livestock watering, wildlife habitat and aquatic wildlife (chronic and acute)
- Total recoverable and dissolved fractions for all metals being analyzed,
- Hardness for calculation of hardness dependent standards,
- Field parameters (i.e., pH, temperature and conductivity)
- Total dissolved solids and total suspended solids.

The number of samples depended on the number of pools encountered. Samples were collected from the following physical reaches:

- P0 (Bayard Canyon and tributaries)
- P1 (Hanover Creek)
- P2 (Upper Whitewater)
- P3 (Whitewater from railroad trestle on north end of Lake 1)
- P9 (Whitewater on either side of Hwy 180)

Within these physical reaches, previous rainfall pool sample locations were selected when possible. Sample locations attempted to capture the variability of pools within the entire physical reach. The physical reaches adjacent to the Chino tailings ponds were not included because they are man-made diversion as opposed to natural channel. The physical reaches south in Lower Whitewater Creek (i.e., south of P9) were not included because pools disappear quickly in the basin fill materials and access is difficult in the rainy season

In order to evaluate the usability of the data for meeting project objectives, the data must be reconciled with project objectives and decision criteria, as applicable. Only data considered to be valid, as determined through data validation, may be considered for reconciliation with project objectives. Thus, a summary of data validation results is provided in Section 2.1 below.

For the comparison to decision criteria for surface water samples, the reconciliation process begins with a comparison of the reporting limits obtained to the decision criteria. In general, for data to be considered usable for making project decisions, the reporting limit obtained for each analyte must be less than or equal to the decision criterion. However, analyte results for which the reporting limit is greater than the decision criterion may be usable if the sample results obtained were positive. Nondetect results at reporting limits which exceed decision criteria are not sufficient for making project decisions based on those criteria. With this in mind, the reporting limits obtained for samples collected for the evaluation are compared to the screening criterion in Section 2.2.

After evaluating the usability of the data with respect to reporting limits obtained and project decision criteria, any potential biases and imprecision in results suggested by QC results must be assessed in order to evaluate the ultimate usability of the data for making decisions. Potential biases and imprecision in analytical results and data usability are discussed in Section 2.3.

One total recoverable metals field duplicate sample and one dissolved field duplicate sample were collected for the surface water samples and can be used to evaluate the representativeness of the samples to the medium sampled. The results of this evaluation are discussed in Section 2.4.

2.1 Data Validation Summary

The total number of results reported for the surface water sample to be used as the ecological evaluation is 504. The total number of results is calculated by summing the number of analytes reported for all samples analyzed. This subsection below discusses the data validation summary for the surface water samples.

Based on the results of data validation, 8.5% of the results were qualified as estimated, 3.1% of the results were qualified as nondetect, and none of the results were qualified as unusable.

Sixteen of the results were qualified as nondetect due to method blank and/or calibration blank contamination. These results comprise 3.1% of the data set.

None of the results were qualified as unusable.

Approximately 8.5% of the results (43 of 504) were qualified as estimated for various reasons. The breakdown of the reasons for qualification as estimated is as follows:

- None of the results were qualified as estimated on the basis of exceeding holding time.
- None of the results was qualified as estimated due to low or high post-digestion spike recoveries.
- Twenty-six of the results were qualified as estimated due to high or low matrix spike recoveries. These results comprise approximately 5.2% of the data set.
- None of the results were qualified as estimated due to high or low CRDL standard recoveries.
- Six of the results were qualified as estimated on the basis of field or method duplicate results. These results comprise approximately 1.2% of the data set.
- None of the results were qualified as estimated on the basis of the serial dilution results.
- Ten of the results were qualified as estimated due to the ICSA standard. These results comprise approximately 2% of the data set.
- One of the results was qualified as estimated on the basis of the method blank and/or calibration blank. This result comprises approximately 0.2% of the data set.

All analytical data generated were considered usable for reconciliation with project objectives as these data were considered to be valid (valid data include results qualified as estimated or nondetect).

2.2 Reporting Limits and Decision Criteria Comparison

In order to determine whether the data are sufficient for comparing to the decision criteria, the reporting limits obtained need to be reconciled with the decision criteria. Table 2-1 lists the decision criteria for the surface water samples and the requirements for reporting limits.

All analytes satisfied the reporting limits specified and summarized in Table 2-1.

Five antimony results were qualified as nondetect on the basis of various combinations of method blank and/or continuing calibration blank contamination. For results qualified nondetect based on blank levels, the reported values then become the "effective" reporting limits. In each instance the "effective" reporting limit for antimony was below the reporting limit requirement of 20 µg/l. Therefore, the elevated reporting limits do not affect the usability of the results for making the specified decision.

One boron result, one zinc result, and one nickel result were qualified as nondetect on the basis of method blank contamination. The "effective" reporting limits for these boron, zinc, and nickel results were below the reporting limit requirement of 10 µg/l, 10 µg/l, and 40 µg/l, respectively. Therefore, the elevated reporting limits do not affect the usability of the results for making the specified decision.

2.3 Effect of Potential Biases and Imprecision on Usability of the Data

Any potential biases and imprecision in results suggested by QC results must be assessed in order to evaluate the ultimate usability of the data for making decisions. Potential biases and imprecision in analytical results are inferred from results obtained for various types of quality control sample analyses. Potential bias and imprecision can result from specific sample matrix analyzed or the analytical system.

Quality control analyses that provide an indication of the analytical system relative to the specific sample matrix include matrix spike analyses, post-digestion spike analyses, method duplicate analyses, and field duplicate analyses. Matrix spike samples are site-specific samples into which target analytes are spiked. As such, the percent recoveries obtained from matrix spike analyses provide an indication of the potential biases of the analyses on the site-specific samples. Additionally, method duplicate analyses provide an indication of the precision of the analyses. A matrix spike and/or duplicate sample analysis (as applicable to the methodology) was conducted for each analysis type using a site-specific sample. In addition, two field duplicate samples were collected and analyzed. These results can be used to provide

an indication of the overall sampling and analytical precision as well as to evaluate the representativeness of the samples collected to the medium sampled.

Results obtained for other QC parameters, such as contract required detection limit (CRDL) standard recoveries and laboratory control sample recoveries (LCS), provide indications of biases existing in the analytical system.

While the results obtained for the vast majority of quality control analyses satisfied the QAP acceptance limits indicating that overall, acceptable levels of accuracy and precision were attained, results for a few quality control results were outside the QAP prescribed acceptance limits. Quality control results that suggest a potential bias in the analytical result are discussed below for the samples collected along with their effect on the usability of the associated data.

Barium Accuracy – Both matrix spike recoveries were below the lower limit of the acceptance range of 75-125% with an average recovery of 7%, suggesting a potential low bias. The magnitude of the potential low bias may be 93%.

The dissolved barium results ranged from 26.8 µg/l to 78.7µg/l. There are no appropriate designated use standards for barium. Therefore, the potential bias does not affect the usability of the results for making the specified decision.

Silver Accuracy – Both matrix spike recoveries were below the lower limit of the acceptance range of 75-125% with an average recovery of 61%, suggesting a potential low bias. The magnitude of the potential low bias may be 39%.

The silver results for the associated samples ranged from nondetect at 0.02 µg/l to 0.09 µg/l. The acute aquatic life standard based on hardness ranged from 0.3 µg/l to 34.9 µg/l. Because the silver results were at least a factor of 3 times lower than the criterion, the magnitude of the potential low bias in the silver results does not affect the usability of the results for making the specified decision.

Cadmium Accuracy - The measurement result of cadmium found in several CCBs (maximum concentration –0.0315 µg/l) suggests a potential low bias in associated sample results of up to – 0.0315 µg/l.

The dissolved cadmium results ranged from nondetect at 0.10 µg/l to 34.2 µg/l. The only cadmium result that the blank accounts for more than 25% of the associated

reported result is for sample BFT-1 (DIS). The acute aquatic standard based on hardness for this sample is 0.479 µg/l. The chronic aquatic life standard based on hardness for this sample is 0.088 µg/l. These results are described in the table below.

Sample ID	Acute Aquatic Life Standard (µg/l)	Chronic Aquatic Life Standard (µg/l)	Sample Result (µg/l)	Potential Bias as a percentage of the difference between the result and the acute aquatic life standard
BFT-1 (Dis)	0.479	0.088	ND (0.10)	017%

DIS = Dissolved Metals ND = Nondetect

The potential bias in the cadmium result represents only 17% of the difference between the reported result and the acute aquatic life standard (a factor of 6). Therefore, since the bias is 6 times less than the difference between the reported result and the standard, the sample concentration is considered usable for demonstrating that the concentration is less than the acute aquatic life standards.

The cadmium result is reported as nondetect at concentration greater than the chronic aquatic life standard. Therefore, the result is not considered useful to demonstrate that the true concentration is either above or below the hardness-dependent acute aquatic life standard. The hardness for this sample reduced the standard to a value below the reporting limit for the analysis.

Antimony Accuracy – The concentration of antimony found in several ICS A (maximum concentration –38 µg/l) suggested a potential low bias in associated sample results (those samples that contained concentrations of interferent elements comparable to those in the ICS A and ICS AB) of up to –38 µg/l.

The dissolved antimony results ranged from nondetect at 5.5 µg/l to 17.5 µg/l. There are no appropriate designated use standards for antimony. Therefore, the potential bias does not affect the usability of the results for making the specified decision.

2.4 Representativeness Evaluation

Representativeness is the degree to which data accurately and precisely represent a characteristic population, parameter variations at a sampling point, or an environmental condition. All sampling and analysis was conducted in compliance

with the FSP and relevant standard operating procedures (SOPs) as a means of obtaining representative samples.

Additionally, the results obtained for field duplicate results can be used to assess representativeness. Two field duplicate samples were collected. The results for the two field duplicate samples were compared using the applicable concentration-dependent evaluation criteria. All analytes satisfied the applicable concentration-dependent criteria indicating that the samples collected can be considered representative of the medium sampled at the locations.

TABLE 2-1
REPORTING LIMIT REQUIREMENTS AND DECISION CRITERIA FOR SURFACE WATER SAMPLES

Analyte	Reporting Limit Requirements (µg/l)	SVL IDL (µg/l)	Livestock Watering (µg/l)		Wildlife Habitat (µg/l)		Acute Aquatic Life Standard (µg/l)		Chronic Aquatic Life Standard (µg/l)[1]	
Aluminum	30	6.9	---	---	---	---	750	D	87	D
Antimony	20	5.5	---	---	---	---	---	---	---	---
Arsenic	25	4.5	200	D	---	---	340	D	150	D
Barium	2	0.3	---	---	---	---	---	---	---	---
Boron	40	8.4	500	D	---	---	---	---	---	---
Cadmium	.042/.105[2]	0.02	50	D	---	---	0.522 / 2.014*	D	0.094 / 0.246*	D
Chromium	6	0.7	1000	D	---	---	183.06 / 569.76*	D	23.81 / 74.11*	D
Cobalt	6	0.2	1000	D	---	---	---	---	---	---
Copper	.2/.5	0.03	500	D	---	---	3.640 / 13.439*	D	2.739 / 8.956*	D
Iron	60	1.5	---	---	---	---	---	---	---	---
Lead	.220/.550[2]	0.05	100	D	---	---	13.882 / 64.581*	D	0.541 / 2.517*	D
Manganese	4	0.8	---	---	---	---	---	---	---	---
Mercury	0.2	0.1	10	D	0.77	T	1.4	D	0.77	D
Molybdenum	8	1.4	---	---	---	---	---	---	---	---
Nickel (Ni)	10	1.9	---	---	---	---	144.92 / 468.24*	D	16.095 / 52.006*	D
Selenium	0.625	0.05	5	D	5	TR	20	TR	5	TR
Silver	.03/.075[2]	0.008	---	---	---	---	0.296 / 3.217*	D	---	---
Thallium	.1/.25[2]	0.02	---	---	---	---	---	---	---	---
Vanadium	5	0.7	100	D	---	---	---	---	---	---
Zinc	10	0.4	25,000	D	---	---	36.20 / 117.18*	D	39.50 / 118.13*	D
Total Dissolved Solids	10	10	---	---	---	---	---	---	---	---
Total Suspended Solids	5	5	---	---	---	---	---	---	---	---

IDL – Instrument Detection Limit (µg/l)– micrograms per liter D = Dissolved TR = Total Recoverable

[1]As per NMED, Title 20, Chapter 6, Part 4, Section 12- Compliance with Water Quality Standards - The hardness dependent formulae for metals shall be valid only for hardness value 0-400 mg/l. For values above the 400 mg/l, the value 400 mg/l shall apply.

*The standard values are provided for hardnessess of 25/100 mg/l

[2] Dissolved Reporting limits/Total reporting limits (Only dissolved standard applies)

3. POTENTIAL ADDITIONAL DATA USES AND LIMITATIONS

In addition to use in making decisions specified in the FSP, the data generated potentially may have other end uses including risk assessment and exploratory data analysis. The analytical data quality is generally considered sufficient for these potential end uses, however, the magnitude of potential biases and imprecisions discussed above must be considered. Prior to use in meeting these other objectives, end users of the data should perform a data quality assessment relative to their specific end use objectives and should perform an evaluation of whether the analytical data are sufficiently representative of the medium under evaluation. The discussion on reporting limits, bias, and representativeness should be useful in performing a data quality assessment relative to other end uses of the data and in evaluating whether the data are sufficiently representative of the medium under evaluation for a specified end use.

All analytical results not qualified as rejected are considered useable in these additional potential end uses. All data were validated in accordance with the provisions of the Administrative Order on Consent approved Quality Assurance Plan (March, 1997) using guidance from the USEPA National Functional Guidelines for Inorganic Data Review (February 1994). The data validation meets the minimum requirements specified in USEPA's Risk Assessment Guidance for Superfund (September, 1989) (RAGS) and those specified in USEPA's Guidance for Data Usability in Risk Assessment (April, 1992) (DURA). Data qualified as estimated were assigned a "J" qualifier and data rejected during validation were assigned an "R" qualifier and are not useable for any end use. All data which were qualified as estimated were assigned a qualifier code indicating the reason for qualification and a suffix to the qualifier code indicating the potential bias direction based on the QC indicators. The qualifier codes have been annotated on the analytical result reporting forms and also entered into the project database management system. A code suffix of "L" for a given result indicates a potential low bias exists, "H" a potential high bias, and "I" indicates imprecision in the result without a bias direction being discernible from the QC indicators.

As specified in DURA, data qualified as "U" (nondetect) or "J" (estimated) are acceptable for risk assessment purposes. DURA (page 5-15) further indicates that:

"the guidance here is to use J-qualified concentrations the same way as positive data that do not have this qualifier. If possible, note potential uncertainties associated with the qualifier, so that if data qualified with a J contribute significantly to the risk, then appropriate caveats can be attached."

Section 2.4 above provides a detailed description of the magnitude and direction of potential biases associated with J-qualified data and should be useful to the risk assessor in evaluating the uncertainty associated with qualified results.

4. SUMMARY OF DATA QUALITY ASSURANCE OBJECTIVES RELATIVE TO THE QAP OBJECTIVES

In this section, the results of the data validation process are briefly summarized relative to each of the data quality assurance objectives. The Data Validation Report for the Surface Water Samples (URS, January 2007) provides additional detailed narratives describing each QC problem and the data qualification assigned if necessary. The overall data quality was assessed by the quantitative parameters of reporting limits, accuracy, precision, and completeness and the qualitative parameters of representativeness and comparability. Sections 4.1 and 4.2, respectively, present the overall assessment of the data quality with regard to the quantitative and qualitative evaluation parameters.

4.1 Quantitative Parameters

The overall assessment for each of the quantitative data quality assurance parameters (of reporting limits, accuracy, precision, and completeness) is provided below. The summaries are based on the results obtained during the data validation process.

4.1.1 Reporting Limits

Reporting limits (RLs) are established by the analytical laboratory based on the method detection limits (MDLs), historical data, and comparison to EPA limits for the respective methods. As discussed in Section 2.2, all reporting limits satisfied the reporting limit requirements

Five antimony results were qualified as nondetect on the basis of various combinations of method blank and/or continuing calibration blank contamination. For results qualified nondetect based on blank levels, the reported values then become the "effective" reporting limits. In each instance the "effective" reporting limit for antimony was below the reporting limit requirement of 20 µg/l. Therefore, the elevated reporting limits do not affect the usability of the results for making the specified decision.

One boron result, one zinc result, and one nickel result were qualified as nondetect on the basis of method blank contamination. The "effective" reporting limits for these boron, zinc, and nickel results were below the reporting limit requirement of 10 µg/l,

10 µg/l, and 40 µg/l, respectively. Therefore, the elevated reporting limits do not affect the usability of the results for making the specified decision.

4.1.2 Precision

Precision is defined as the agreement between a set of replicate measurements without assumption or knowledge of the true value. Precision of laboratory measurements was evaluated by the comparison of sample/sample duplicate results.

With one exception, all of the method duplicate results satisfied the applicable evaluation criteria. The RPD between the sample result and the duplicate result for total recoverable copper for sample HC-51.6 exceeded the evaluation criterion of ≤20% with a RPD of 85%. Therefore, all total recoverable copper results were qualified as estimated (J/UJ). Therefore, the overall level of precision demonstrated by the analyses is considered to be acceptable

Precision of field sampling and laboratory analysis was evaluated by the comparison of field duplicate sample results. The agreement shown by the field duplicate results (100% met precision criteria) is indicative of an acceptable level of overall sampling and analysis precision.

4.1.3 Accuracy

Accuracy is defined as the degree of agreement of a measurement to an accepted reference or true value. Accuracy was measured as the percent recovery (%R) of an analyte in a reference standard or spiked sample.

The results for all calibration standards and laboratory control samples were within acceptance limits demonstrating acceptable overall accuracy of the analytical system.

Approximately 93% of the surface water matrix spike recoveries were within acceptance limits indicating that the overall level of accuracy attained with respect to the site-specific sample matrix is considered to be acceptable.

4.1.4 Completeness

Two types of completeness were calculated, program completeness and analytical completeness. Sections 4.1.4.1 and 4.1.4.2 provide respective definitions and a summary of the results.

4.1.4.1 Program Completeness

The program completeness is considered to be 100% because all samples were collected from all of the planned sampling stations and the quantity of field QC samples collected met QAP requirements.

4.1.4.2 Analytical Completeness

All of the results are considered usable as qualified. As such, the analytical completeness for the Surface Water investigation samples, defined as the ratio of the number of valid analytical results (valid analytical results include values estimated) to the total number of analytical results requested on samples submitted for analysis, is 100% which satisfies the QAP requirement of 80%. All valid results are considered acceptable for use in meeting project objectives.

4.2 Qualitative Parameters

The qualitative data quality assessment parameters include comparability and representativeness. Sections 4.2.1 and 4.2.2 provide the respective definitions and summary of the results for each parameter.

4.2.1 Comparability

Comparability expresses the confidence with which one data set can be compared to another. Comparability can be related to accuracy and precision because these quantities are measures of data reliability. Data are comparable if collection techniques, measurement procedures, method, and reporting limits are equivalent for the samples within a sample set. As the samples in this set were analyzed in accordance with the quality assurance and quality control measures prescribed in the QAP; and acceptable levels of overall accuracy and precision were attained, the data within this set are considered to be comparable to each other and comparable to other data collected under the RI.

4.2.2 Representativeness

Representativeness is the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an

environmental condition. Representativeness was maintained during sampling efforts by completing sampling in compliance with the FSP, and relevant SOPs.

Consistent, uniform sample collection protocols, including such tasks as storage, preservation and transportation, were used to assure that the representativeness of the samples gathered during the AOC met project objectives. Proper documentation in the field and laboratory verified that protocols were followed and that sample in identification as well as integrity was preserved. As noted in Section 2.4, the agreement between the field duplicate samples suggest that the samples collected can be considered representative of the medium sampled.

5. CORRECTIVE ACTIONS AND WORKPLAN MODIFICATIONS

This section describes the corrective actions implemented and workplan modifications that occurred during the supplemental sampling and analysis and the effect on the usability of the data.

5.1 Corrective Action

No field corrective actions were required during this investigation.

The laboratory resubmitted the total recoverable data sheets for data package 125480 because the matrix spike recoveries for the ICP-MS analysis performed on sample HC-51.6 were calculated using the wrong spike amount.

5.2 QAP and FSP Modifications

No modifications were made to the QAP.

6. REJECTED DATA AND PROJECT CONSEQUENCES

No data were qualified as unusable, so all results will be considered for use in meeting project objectives.

7. CONCLUSIONS

With the exceptions of the limitations noted in Section 2.0, the data are considered to be usable for meeting project objectives. As described in Section 3.0, these data are also considered to be of sufficient analytical quality for a variety of other end uses. For end uses of the data other than those for which are specified in Section 2.0, the end user of the data should perform a data quality assessment relative to their specific end use objectives and should perform an evaluation of whether the analytical data are sufficiently representative of the medium under evaluation for their specific data use.